SECRET AUSCANUKUS

287

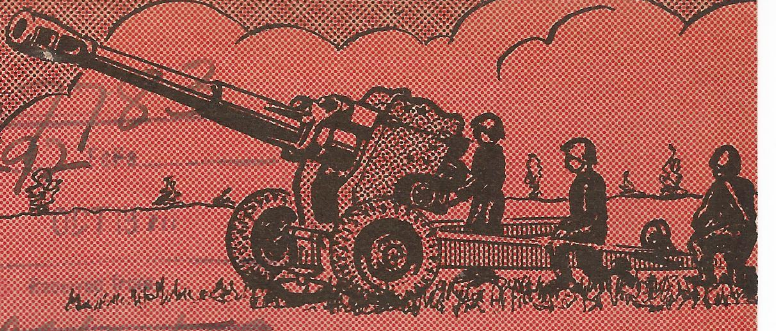
S/7/82
File 29/2
OCT 1970
RAC Centre

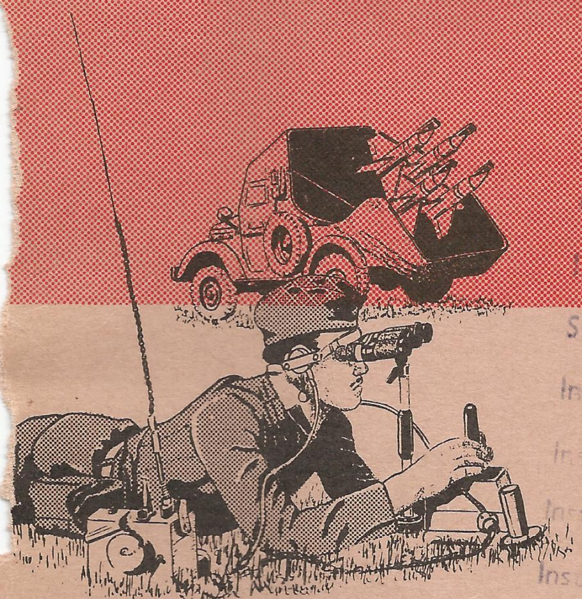
HEADQUARTERS
OCT 1970
R.A.C. CENTRE

UNCLAS

ARMY TECHNICAL INTELLIGENCE REVIEW

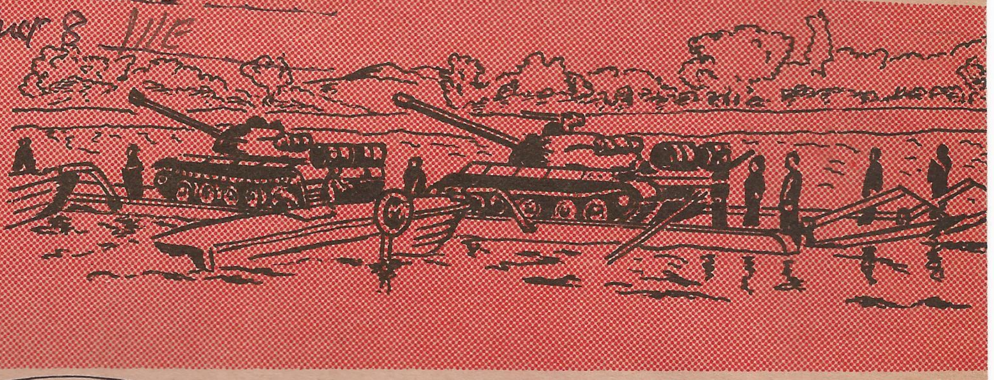
Armour School
15 OCT 1970

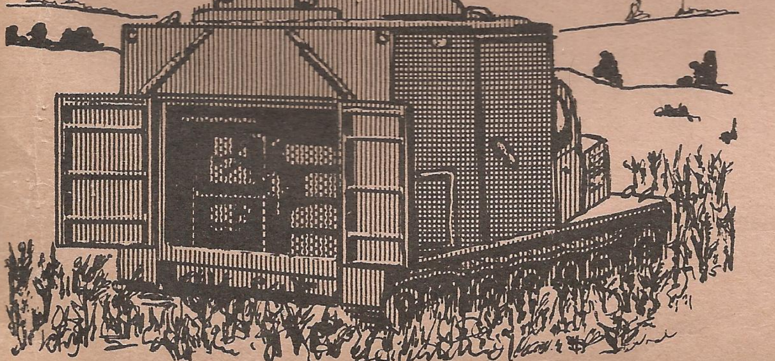




I.O.
S.I.
Instr. 3.
Instr. 4. 26/3
Instr. 5. CWB 20/11
Instr. 6. PKE 23 Nov.
C.C.
Inst 7
Inst 8 LLE

JULY 1970





No 97

SECRET AUSCANUKUS

ARMY TECHNICAL INTELLIGENCE REVIEW No 97 (SECRET)

JULY 1970

INDEX

Page

FOREWORD

1. CHICOM Type 62 Light Tank 3
2. North Korean RPG-2 with A/Pers Warhead 7
3. Rumanian Modified Soviet AKM Assault ~~Gun~~ Rifle 8
4. Arming of Soviet Helicopters 9
5. Soviet Mine Clearing Device KMT-5 13
6. East German Army Truck W50 LA/A 15
7. Soviet Rapid Decontamination Device TMS-65 17
8. New Helmet Mask (Albanian) 20
9. Three Tank Launched Bridges 21
10. Soviet Tactical Missiles FROG 7 23
11. STOP PRESS! - New FROG 7 Warhead 36
12. POLE DISH - Radar Intercept and D/F 41
13. Running Index 43
14. Agreed Nomenclature List 55

Total No. of Pages 110

ARMY TECHNICAL INTELLIGENCE REVIEW No 97 (SECRET)

FOREWORD

1. As our readers know we have been struggling to meet our publication deadline for some time now. At last I think we are nearly there! This issue should be with you some time in August.

2. It is gratifying to know that the number of requests for our help and advice is continually increasing. Our desk officers are in constant demand as committee members, as lecturers at MOD Schools and for various formal briefings. The flow of incoming paper to the Branch has more than doubled during the past year with no increase in staff, so please bear with us if we appear to be slow in answering any of your queries.

3. Since our last issue there have been further staff changes. Major Rex Clark has returned 'down under' via San Fransisco, Hawaii and all points West. We are very sorry to lose him. His desk is being looked after by Major Ronnie Adam, Q.O. Hldrs, until September when Major Brian Faris, Queens takes over. Our Infantry readers will no doubt be pleased to know that for the first time in many years the Infantry/Airborne desk is back in the 'proper' hands!

4. The Artillery desk has also changed occupants. Major Fred Hall has gone back over the water and his place has been taken by Major Argie Haddock fresh from a year as a student at Bovington.

5. A final plea - there is always a shortage of earlier editions of the Review. If you find it necessary to get rid of back numbers please return them to us.

S.C. SMITH
Colonel
Tech Int (A)

Corrigendum:

ATIR No 95
Page 9
Length of weapon 2.20m
delete 47 inches insert 86½ inches.

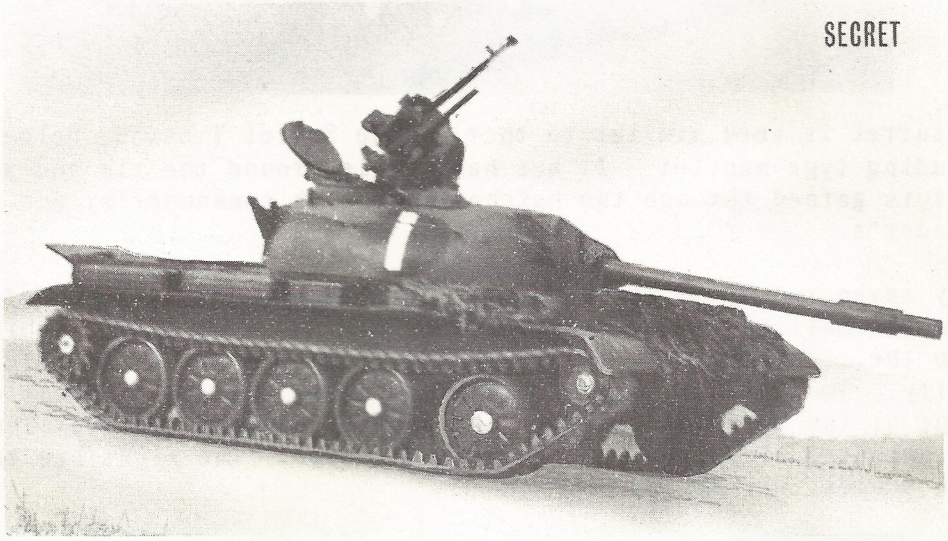
1. Chicom Type 62 Light Tank (SECRET)

General

The appearance of a new tank, especially Communist is an event of some importance.

We have known of the Type 62 light tank for some time, however good photography eluded us until recently.

As far as we know the Type 62 has been in production in China for at least ten years, however exact numbers made or how they fit into the Chicom orbat are not known.

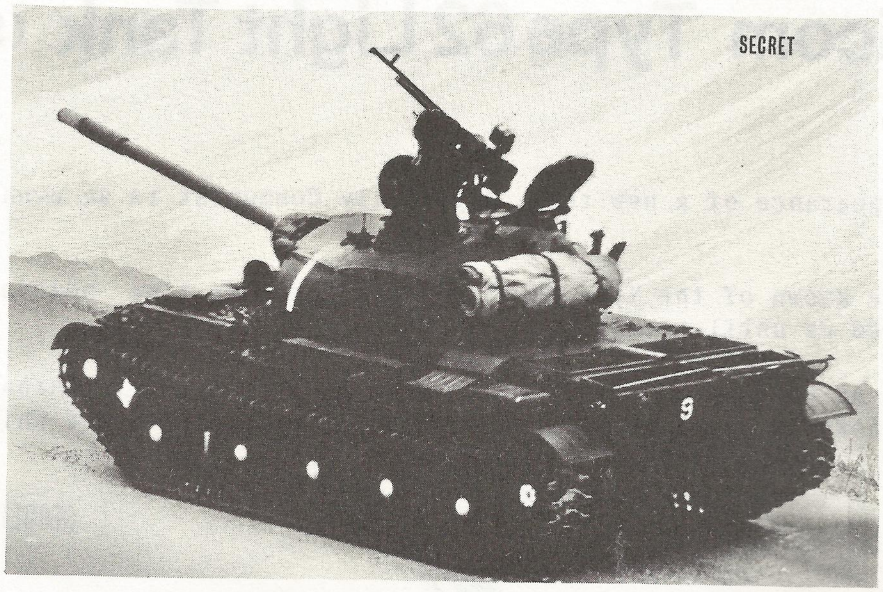


Impressions of the CHICOM Type 62 Light Tank

This tank is very similar to the Russian T 54/55. The suspension is of the Christie-type and the track links are connected much the same as those of the Centurion. It has single rear wheels, torsion bar suspension, the front idler is approximately 0.7 metres high and the teeth of the drive sprocket protrude through the track and would be vulnerable to damage when reversing on slopes. There are three external fuel tanks, having a total capacity of approximately 227 litres. They are very soft-skinned much like jerry can material. Re-fuelling is a slow process.

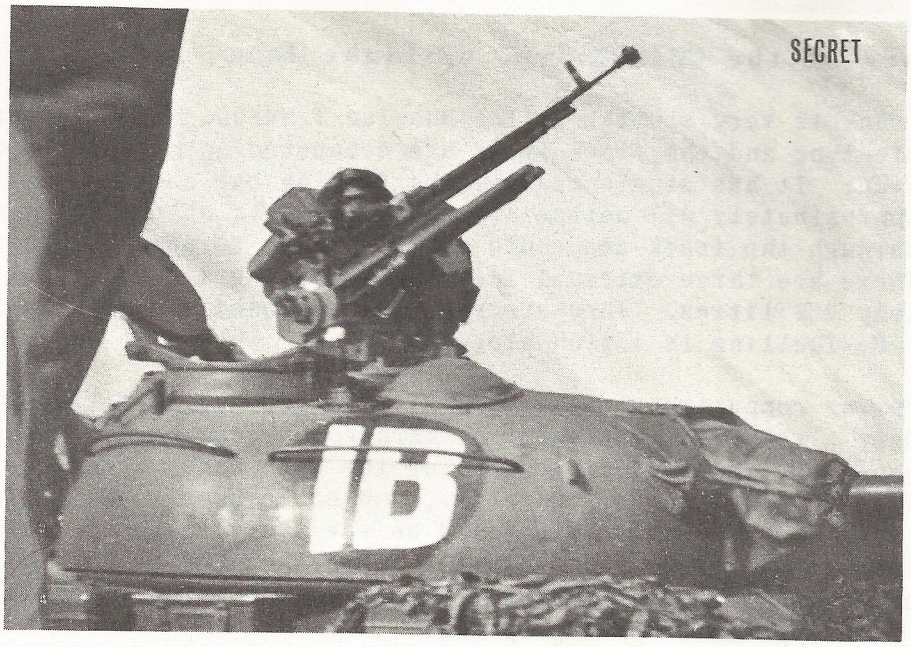
The engine compartment contains a V-12 diesel engine fitted at right angles. Only a very limited amount of maintenance can be done unless the rear deck is completely taken off. By opening the main hatch access is gained to the fuel filters, fuel pumps, injectors, and air cleaners only. The oil tank is at the rear of the vehicle and would be very vulnerable to small-arms fire. A limited amount of armour protects it. The oil can be heated by the coolant. The engine fan is located at the rear of the transmission compartment and is driven by what appears to be a prop shaft.

CHICOM Type 62 Light Tank (continued)



The turret is very similar to that of the Soviet T 54/55, being cast with the protruding type mantlet. It has hand rails around the rim and access to the turret is gained through two hatches, the crew commander's, and the gunner loader's.

Forty seven rounds of ammunition are stowed around the walls of the turret and around the hull in clip-type holders. The 7.62 mm co-axial machine-gun is mounted to the right of the main armament. It can be fired electrically or mechanically. To the left of the main armament is the gunner position, with a periscope of the fixed ballistic type, approximately three feet long. It can be illuminated electrically and has a demister. The sight has three ammunition scales, HE, AP and MG.



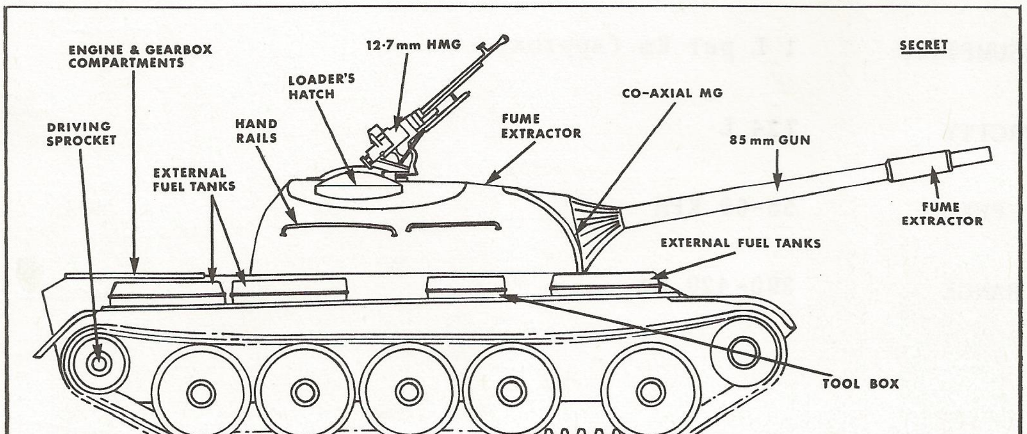
CHICOM Type 62 Light Tank (continued)

The main armament is an 85 mm gun. The breech block opens vertically downwards and the recoil is approximately 10 inches. The depression is very limited.

The radio set is located on the left side of the turret; it is a high frequency set and is believed to operate within the frequency range of approximately 20-27 MHz. It is of the self-tuned type with helmet-type headgear complete with microphones.

Directly behind the driver, in the front of the turret, are four twelve volt batteries stacked one on top of the other.

The vehicle's maximum speed is approximately 55-60 km/hr, on roads and 16-23 km/hr cross country. The fuel consumption cross country is about 176 litres per 100 km; and on hard roads 120-123 litres per 100 km.


ENGINE & GEARBOX COMPARTMENTS
12·7mm HMG
SECRET
LOADER'S HATCH
CO-AXIAL MG
DRIVING SPROCKET
HAND RAILS
FUME EXTRACTOR
85 mm GUN
EXTERNAL FUEL TANKS
FUME EXTRACTOR
EXTERNAL FUEL TANKS
TOOL BOX

CHICOM Type 62 Light Tank (continued)

Technical Details

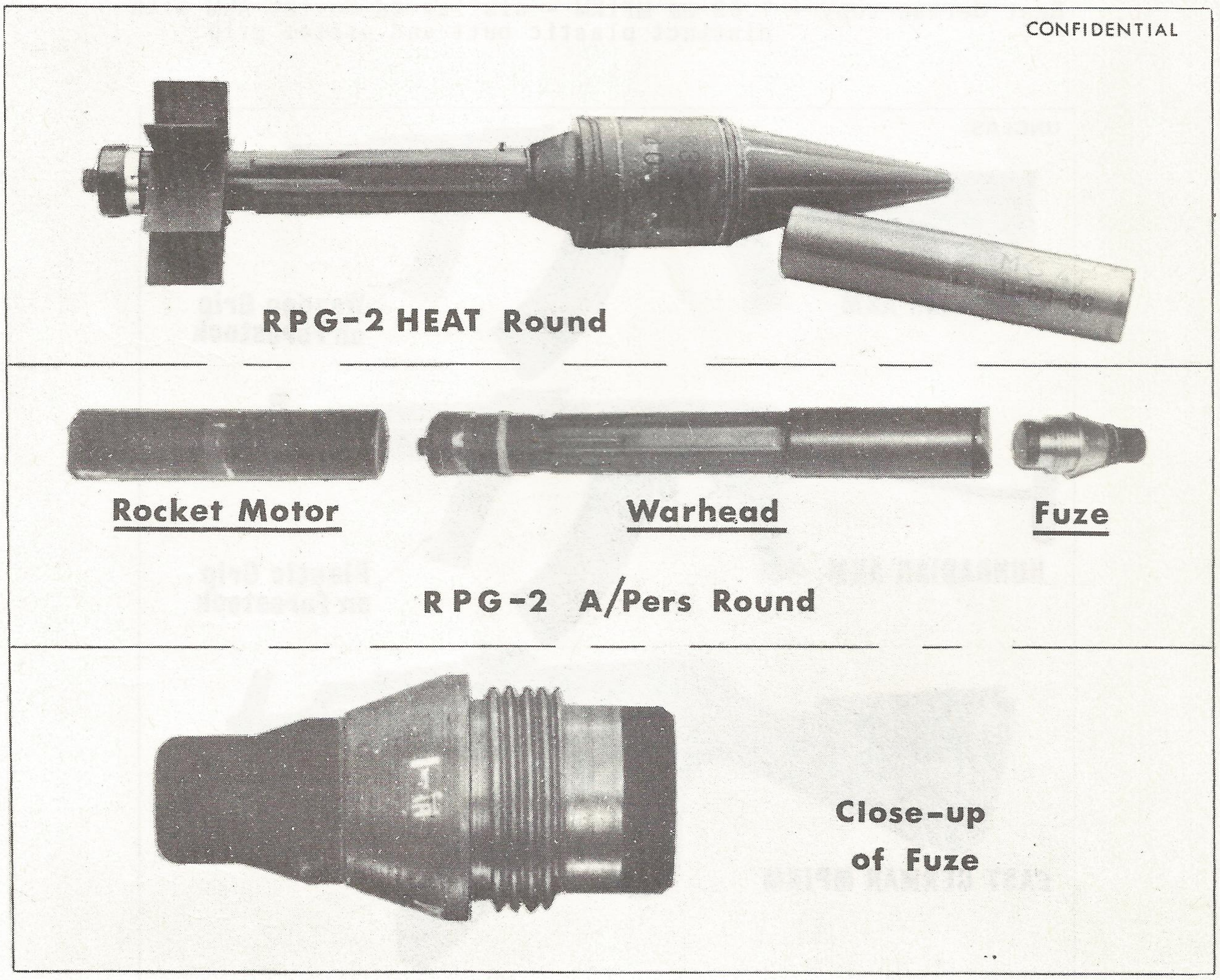
CREW	4	
DIMENSIONS		
	Overall Length (incl gun)	26 ft (7925 mm)
	Height	7.7 ft(2311 mm)
	Width	9.4 ft(2844 mm)
BATTLE WEIGHT	21 tons	
ARMOUR THICKNESS		
	Turret Front	45 mm
	Hull Front	35 mm
	Hull Sides	25 mm
	Hull Rear	15 mm
	Belly	10 mm
ARMAMENT		
	Main	85 mm
	Secondary AA	12.7 mm HMG
	Co-Axial	7.62 mm MG
	Bow	7.62 mm MG
AMMUNITION CARRIED	47 Rounds	Main Armament
ENGINE	V12 Diesel	
FUEL CONSUMPTION	1 L per Km (Approx)	
FUEL CAPACITY	724 L	
MAXIMUM SPEED	55-60 KPH	
VEHICLE RANGE	390-420 Km	

2. North Korean RPG-2 with Anti-Personnel Warhead (CONFIDENTIAL)

The RPG-2 is the well known anti-tank grenade launcher used by most Warsaw Pact countries. This weapon was introduced into service in 1949 and recent reports indicate it being phased out of service in favour of the RPG-7V although many RPG-2 are still in use. The recovery in Korea of an anti-personnel warhead for the RPG-2 could indicate that it might be in service for some time.

The anti-personnel warhead is a steel cylindrical extension of the standard type rocket motor and is about 1.7 inches in diameter with a length of 5.8 inches. The warhead which has an impact type nose fuze weighs about 2 pounds. The explosive filling is TNT and the fuze is a copy of the Soviet M-1 mortar fuze.

It is not known if the anti-personnel warhead is of Soviet design or not. The appearance of this type of warhead could give the RPG-2 a multi purpose capability which makes it a very good weapon for use in terrorist activities. Collectors should watch for a possible similar type warhead for the RPG-7V.



North Korean RPG-2 with Anti-Personnel Warhead

3. Rumanian - Modified Soviet AKM Assault Rifle (SECRET)

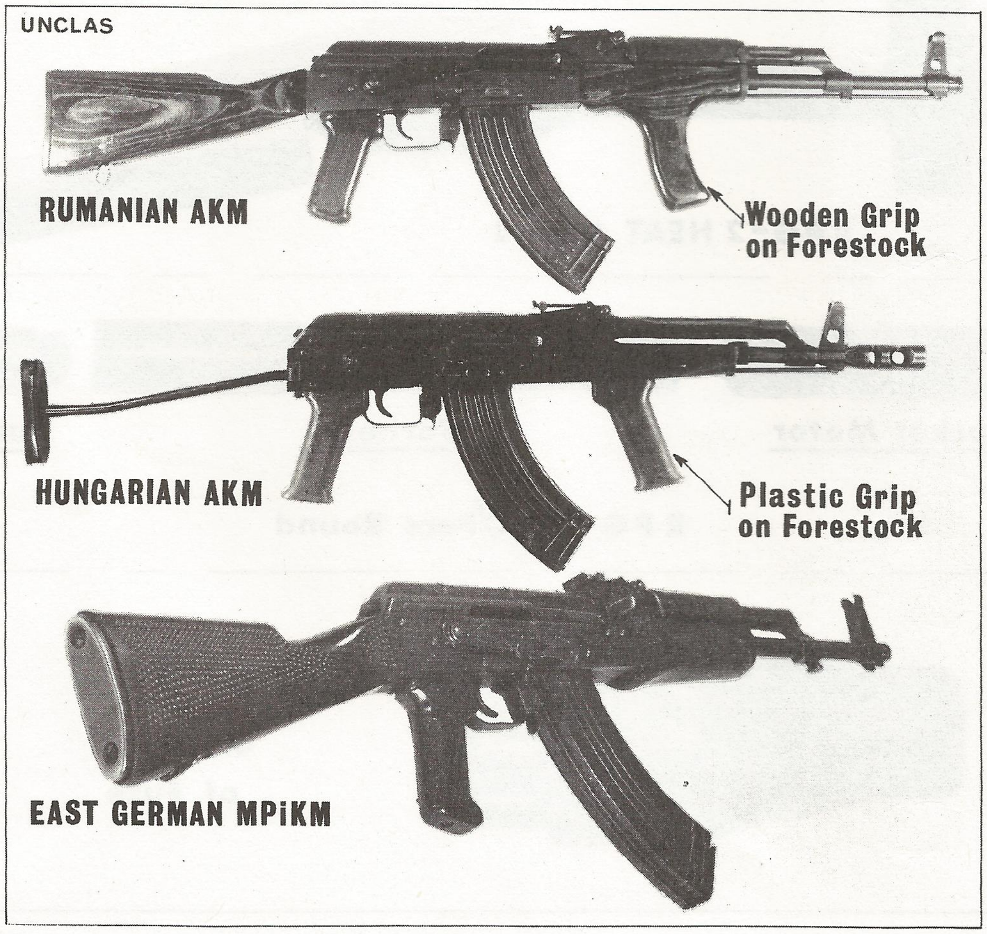
Recently a Rumanian modified AKM was captured in SOUTH VIETNAM. The modification was the addition of a pistol grip to the forestock of similar shape to the the Hungarian double pistol grip AKM. The Rumanian version of the pistol grip is constructed of wood in one piece where as the Hungarian plastic forward pistol grip is made separately from the plastic forestock.

The modification of the Soviet AKM by Rumania and Hungary could indicate a dissatisfaction in the Soviet weapon's performance when fired on automatic. The Soviet assault rifles when fired on automatic are difficult to control and the modification of the forward pistol grip should help overcome the barrel climbing problem.

Other known variants of the AKM are:

a. Hungarian copy - 7.62 mm AKM - shorter barrel, a single piece folding metal stock, a metal front hand guard, a flash suppressor and a plastic pistol grip. It has no wooden parts.

b. East German copy - 7.62 mm MPiKM - similar to Soviet AKM with distinct plastic butt and pistol grip.



Variants of the Soviet AKM

4. Arming of Soviet Helicopters (SECRET)

Introduction

At the moment there is a lack of a clear definition of the term 'gunship' as applied to Soviet helicopters. In this article the term 'gunship' refers to a helicopter that has the following features:

a. The helicopter has been designed around the weapons system

b. The crew has special built-in protection

c. The helicopter has been designed to give less vulnerability to ground fire by protected fuel tanks, reduced fuselage areas, etc.

The 'strap-on' armaments at present used by the Soviets do not make a helicopter into a gunship. Such helicopters are of standard design with a special, time limited role and do not meet any of the requirements given above.

Helicopter Organisation

There is evidence that Soviet forces currently organise their helicopters into regiments within Tactical Air Armies but the size of these regiments vary between geographical area. There are additional helicopters integral to ground forces which are employed on liaison and reconnaissance duties.

Employment

There is increasing evidence that the Soviets might employ helicopters in the tactical air assault. Tactical Air Army has the capability of lifting one motor rifle battalion by helicopter. The assault would immediately follow heavy conventional bombardment, and fighter ground/attack sorties, or nuclear strikes.

The helicopters with 'strap-on' armaments could give defensive or suppressive fire during the assault. They also have a limited offensive capability.

Development

During the past year or so, the Soviets have been installing various fittings of rockets and anti-tank guided missiles on several different helicopters. Increasing numbers of reports of helicopters carrying armaments are being received. In all probability, some standardization in 'strap-on' type armament will follow an extensive trial and testing period. At any rate, for the next ten years or so, it appears that most of the Soviet Army armed helicopters requirements will be filled by three well-known Soviet helicopters - the Mi-2, 4 and 8 - carrying offensive and defensive weapons known to us today, but modified and improved as time and technology permit.

Arming of Soviet Helicopters (continued)

Although there is no evidence to this effect, it is possible that, in the future the Soviets will discover a requirement for an integral weapons gunship for use in a tactical air-mechanised unit, defensively or offensively. They have the capability to develop such a gunship and though it certainly would be a costly programme, development and production would be ecomomically feasible for them.

Known Soviet Armed Helicopters

The Soviets are now known to arm at least 5 helicopters:

a. HARE (Mi-1)

b. HOUND (Mi-4)

c. HOOK (Mi-6)

d. HIP (Mi-8)

e. HORMONE (Ka-25)

These helicopters have been observed carrying armament as follows:

a. HARE - AT guided missiles.
  - unidentified gun.

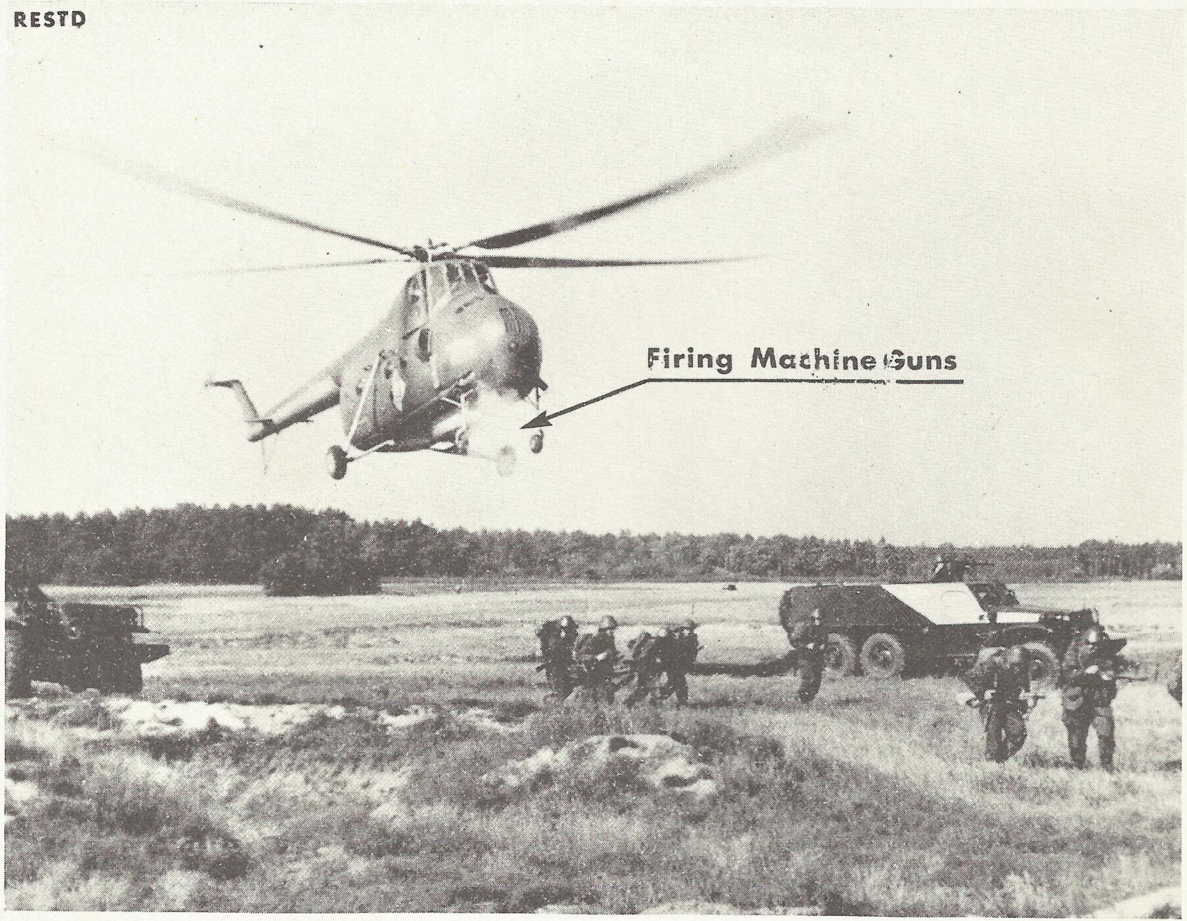
b. HOUND - A12.7P machine gun (12.7 mm, approx 950 rpm)
  - 4 x 16-shot 57 mm rocket pods. 2 pods per side in an over-and-under type mount. A12.7P MG in ventral pod.
  - Recent sighting showed a 3-pylon per side arrangement with a possible overhead sight (top of cabin) indicating ATGM capability.
  - ASW configuration - sonobuoys, depth charges.

c. HOOK - A12.7P machine gun - nose mounted
  - rockets in unidentified configuration.

d. HIP - 4 x 16-shot rocket pods, two per side in a side-by-side mount.
  Same 57 mm rockets as on HOUND.

e. HORMONE - ASW configuration only: sonobuoys, depth charges and torpedo.
  This is the helicopter on the carrier ship MOSKVA and it is also land based.

Arming of Soviet Helicopters (continued)



Helicopter Mi-4 (HOUND) Firing Machine Guns

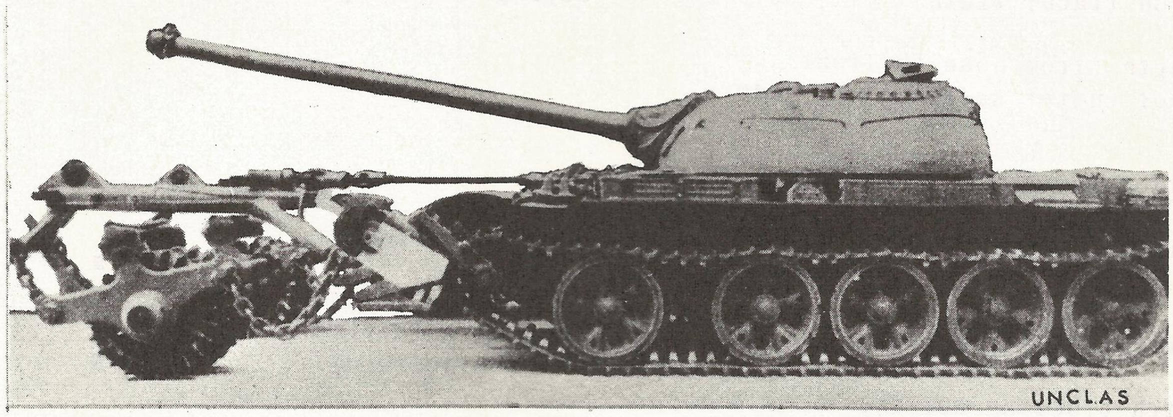
Conclusion

We have no evidence that the Soviets currently have a requirement for an integral weapons gunship. It is our belief that they will take a long, calculated look at the Vietnam experience, evaluating the US integral weapons gunships against Soviet general purpose helicopters associated with the best features of 'strap-on' armament they have been able to develop. This may leave them dissatisfied to be dependent solely on general purpose helicopters with 'strap-on' armament and an integral weapons gunship requirement may result. However, the development to meet such a requirement would take a considerable time.

We therefore estimate that even if the Soviets decide that they have a requirement for integral weapons gunships, they are unlikely to have them in operation, even in limited quantities, before the end of the 1970s.

5. Soviet Mine Clearance Devices
(SECRET)

Soviet mine clearance rollers and ploughs have been discussed in previous ATIR's (Nos 87, 93, 95). In ATIR 95 of October 1969 we said that the mine roller/plough combination could be coming into limited use. Because of the loss in mobility compared with the plough we did not anticipate that it would become standard breeching equipment. However since that article was written there have been fairly frequent sightings of the mine roller/plough combination, especially in East Germany. The combination is now known to be the KMT-5 and a photograph together with some technical details are given below. Notwithstanding the increased number of sightings we are not yet convinced that the advantages which the KMT-5 may have over the mine plough as a clearance device outweigh the disadvantage of limiting the mobility of the operating tank. At this stage we can only wait with interest to see whether the KMT-5 will become the standard mine clearing device or will have only limited use. Even in the latter case it would serve a useful purpose in giving the Soviet Commander a further choice of minefield breaching equipment and would increase our problems of laying effective minefields.



SOVIET Mine-clearing Roller/Plough KMT-5

Mine-clearing device KMT-5 Engineer equipment USSR

Producer USSR

Users E bloc Armies

Use clearing tracks through minefields

Technical Data

Dimensions	mm	Weight	Kg
Width of roller sections (width of cleared track)	730-810	Total	7300-7500
		Roller section (one)	2265

Soviet Mine Clearing Devices (continued)

Technical Data (continued)

Dimensions	mm
Width of cutter section	600
Distance between roller sections	2100
Distance between cutter sections	2160
Dimensions of frame with roller sections on tank, width	4000
Length from nose to front of frame	3180
Dimensions of cutters on track, width	3670
Length (from nose to front of cutter section)	1010

Weight	Kg
Cutter (Plough) section (one)	420
Frames (without cables)	580
Holding cable	40
Cutter (Plough) lifting gear	60
Links	255
[PSK] case	60
Laying out equipment	150

Performance:

Climbing ability	23°	Turning radius, minimum	9 m
Permitted lateral tilt	20°	Turning safe (in minefield)	65 m
Ditch crossing ability	2.5 m		

The KMT-5 is attached to a medium tank and comprises the following parts:

> right and left frames with holding cables, roller sections, plough sections, the device for triggering mines with tilt fuzes, [PSK] case, and the laying-out equipment.

Anti-Tank mines are detonated by the natural weight of the roller sections; the device to detonate tilt fuzes is fixed on links between the roller sections, so that mines with tilt fuzes not on the strips cleared are detonated. The cutter sections plough outwards from the cleared section some of the mines not dealt with by the roller sections. The apparatus carried on the tail of the base vehicle such as the [PSK] case and laying-out equipment mark the cleared lane with lights or rake tracks.

6. New GS Truck for the East German Army (CONFIDENTIAL)

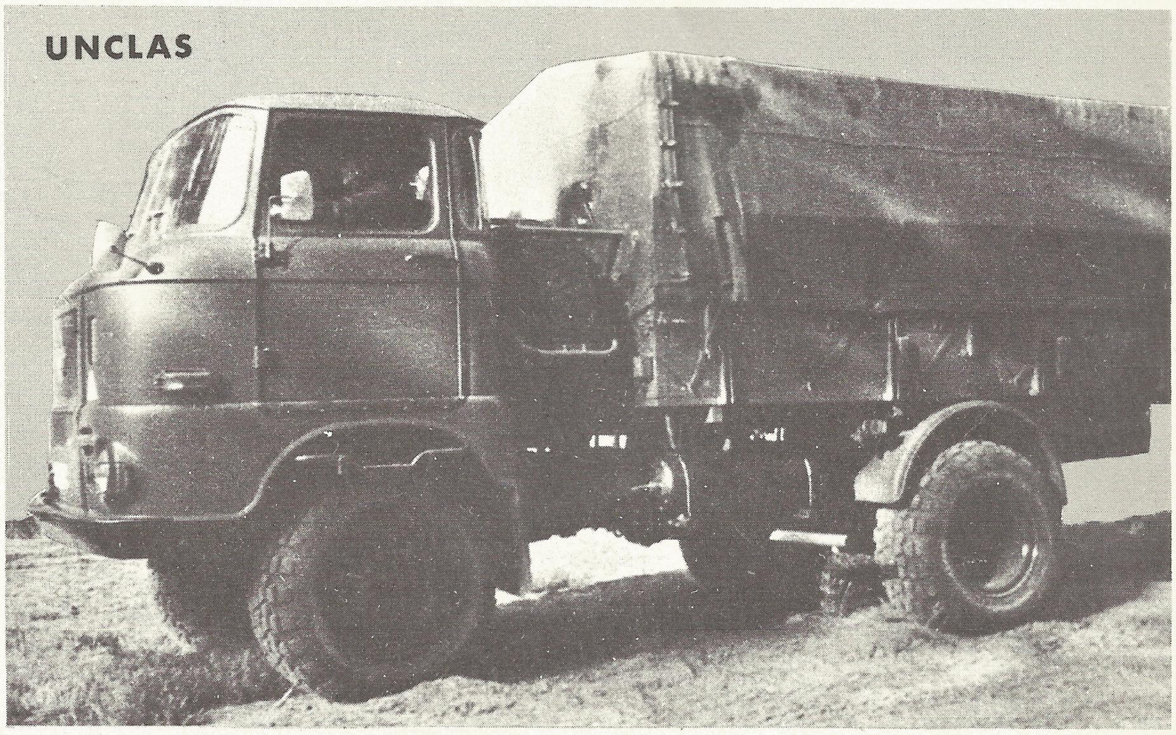
W50 LA/A (4 x 4)

The East German Army is just beginning to receive the W50 LA/A - a 4 x 4, 3 ton vehicle with a good cross-crounty performance. It is powered by a modern 125 hp diesel engine giving the W50 LA/A a top speed of 85 km per hour.

The good cross-country performance is largely due to the system of cab controlled tyre pressures fitted to this vehicle. In addition it has large profile tyres. These two factors enable this vehicle to have a low ground pressure and a large area of ground contact. Differential locks are fitted to both the front and rear axle and are operated pneumatically. It has a ground clearance of some 300 mm beneath the front axle. In order to cross water obstacles over one metre depth an over pressure is maintained in all parts containing oil so that no water can penetrate. Batteries and fuel tanks are water-tight.

The W50 LA/A is fitted with a 4.5 ton winch and is capable of a 9 ton indirect pull.

This modern vehicle is now entering service with the East German Army.



East German Army Truck W50 LA/A

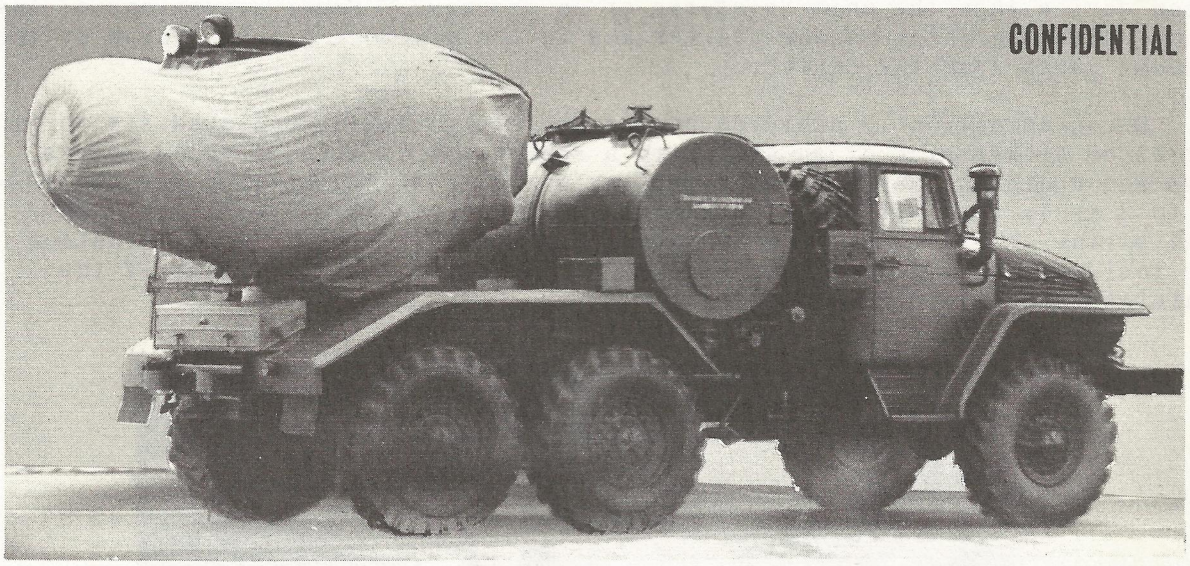
7. Soviet Rapid Decontamination Device - TMS-65 (SECRET)

Background

In Soviet published literature and statements, both biological and chemical weapons are frequently classed with nuclear weapons as 'weapons of mass destruction.' The frequency and nature of such references, and the training exercises and defensive measures taken by the Soviet forces and auxiliary services, point to the acceptance of the necessity to be prepared to operate in an NBC environment. In order to maintain the momentum of the advance under these conditions it is necessary to be able to decontaminate quickly. To this end TMS-65 has been developed with the claimed capability of cleaning the exterior of an AFV in 90 seconds.

Description

TMS-65 consists of the URAL-375E 6 x 6, 4½ ton vehicle with the decontamination device mounted on it. This is an old jet engine based on the Rolls Royce Derwent produced in Russia and is fitted to the MiG-15, MiG-17, IL-28, and other Soviet aircraft. It is mounted to move in both the vertical and horizontal plane and is controlled from a cab mounted on the left hand side of the engine. Between the engine and the vehicle cab is a split two-part tank which contains fuel for the jet engine and decontaminant.



TMS-65 in transit showing the Split Tank and Gas Turbine (It normally tows its own Fuel Bowser Trailer)

Operation

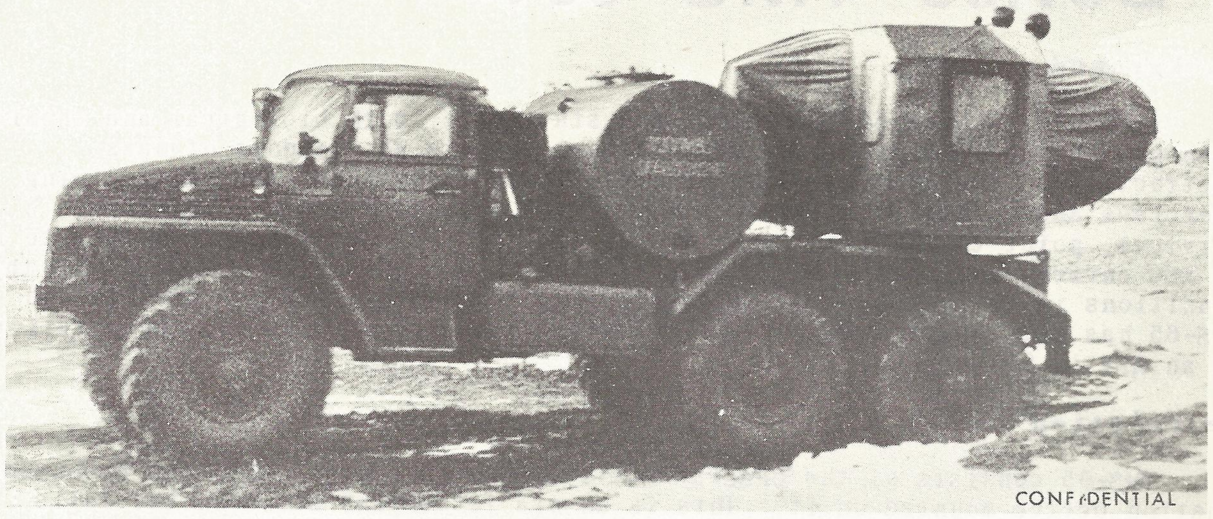
TMS-65 operates in three main modes:

a. Using hot exhaust gases alone

b. With the addition of water into the gas stream - probably in aerosal form

c. With the addition of decontaminant into the gas stream.

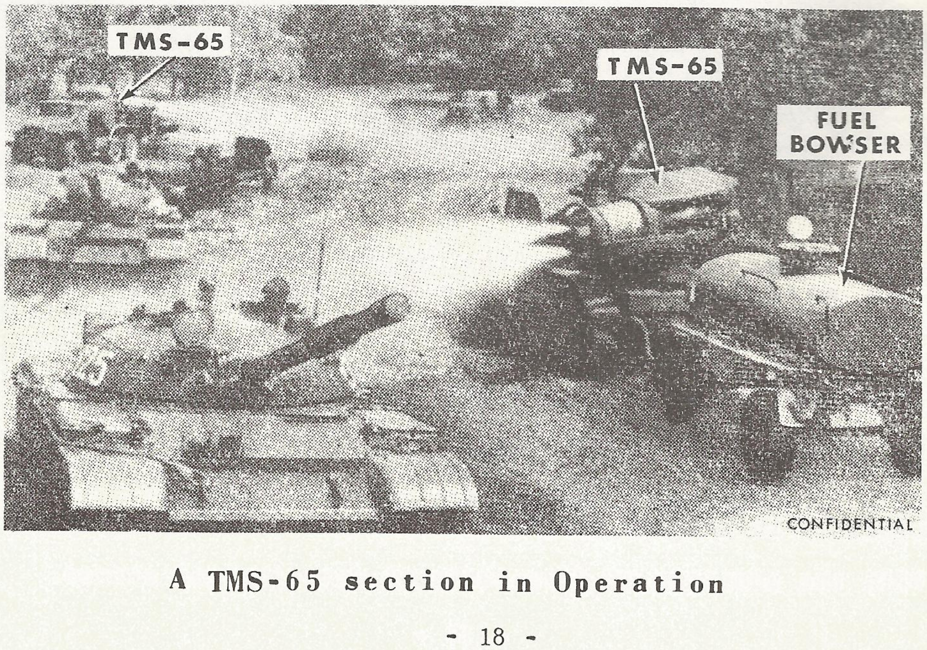
Soviet Decontamination Device TMS-65 (continued)



TMS-65 in transit showing the Operators Cabin

TMS-65, operating in pairs is normally associated with a Bowser trailer, probably designated PTS-6-5207V, and containing water for the decontamination process. It is possible to transfer water from the trailer to the decontamination device when the unit is static or on the move. Under conditions of low temperature the water in the trailer and in the pipework can be heated by the exhaust gases from the engine.

Decontamination is achieved by the use of two TMS-65 deployed six to eight metres on either side of an axis with a separation of some 70 to 80 metres. AFVs and equipment requiring decontamination move slowly between the two TMS-65 (2 to 3 KPH). (See illustration below). Conversely the two TMS-65 can move down a line of stationary contaminated AFVs and equipment. Decontamination of the inside of AFVs and equipments must be carried out by the crews of the vehicles using standard procedures.



A TMS-65 section in Operation

Soviet Decontamination Device TMS-65 (continued)

Pros and Cons

This concept of rapid decontamination has both advantages and disadvantages. These are listed below:

a. Pros

1. Rapid decontamination
2. All weather performance
3. High output.

b. Cons

1. Heavy fuel consumption - probably kerosene
2. Difficulties of concealment due to size and noise
3. The necessary concentration of contaminated equipment.

We believe that the TMS-65 is only effective in decontaminating vehicles to a level which is operationally acceptable for a limited time. It should be noted that this level may not be acceptable to the West.

TMS-65 is now seen in increasing numbers in GFSG. It is an indication of the importance the Soviets attach to this subject.

8. New Helmet Mask (UNCLAS)

An entirely new protective mask, of the hood type, in several variants, has been reported from ALBANIA. It is believed to be based on a Chinese prototype.

The mask has a highly distinctive appearance (see illustration) and possesses a number of horn-like protuberances viz.

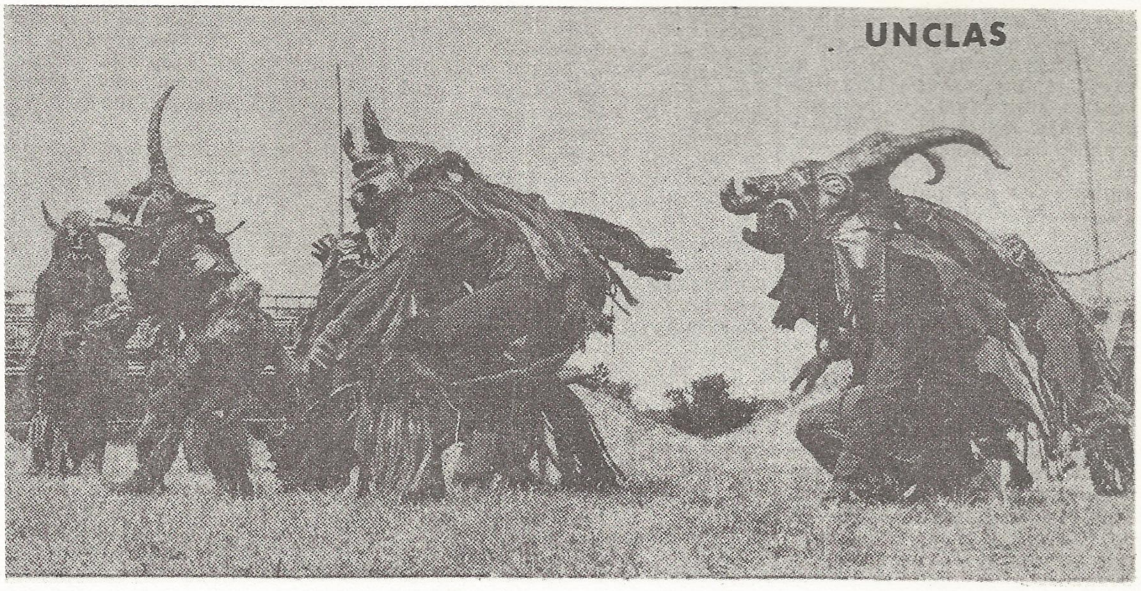
Type A. From the head region, rearward-projecting, some 2 ft in length

Type B. From the lower face region, downward-projecting, less than 2 ft in length.

The mask is reportedly for use of both military and civil personnel, denoting an advanced production/standardisation approach.

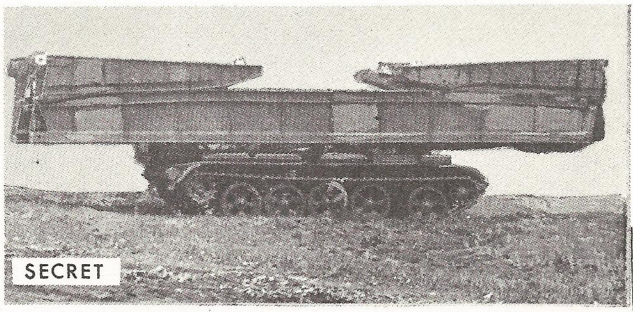
Source of the photograph reported that he understood the mask to be designated the RU-1 and RU-12.

Performance details of the mask are unknown but are eagerly awaited.



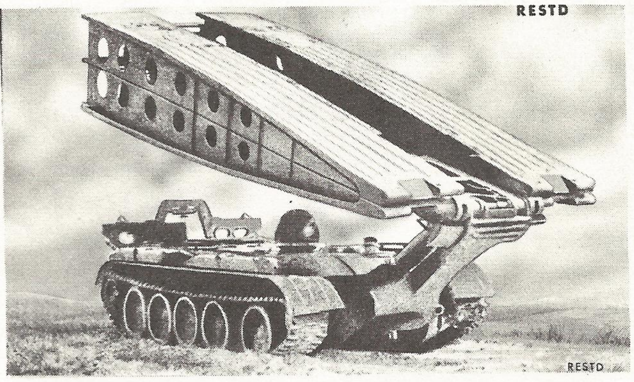
Albanian Helmet Mask

9. Three Tank Launched Bridges (SECRET)



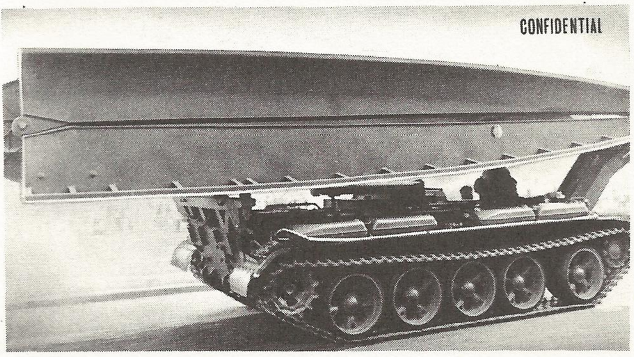
SOVIET
T-55 MTO ◄

CZECH
MT 55 ►



●

EAST GERMAN
SCISSORS ►



The three latest tank launched assault bridges to come into service in Soviet bloc countries are pictured above. The T55 MTU was described in ATIR 91 of October 1968 and the Czech MT55 in ATIR 95 of October 1969.

The most recent addition to the family is the East German Scissors Bridge which was first sighted in late 1969. This bridge is similar in operation to the Czech MT55. The table below gives comparative technical detail for the three bridges. It is of interest to note that the Soviets have kept to the low level, cantilever type launch bridge while the satellite countries have accepted the high silhouette of the scissors type launch bridge.

Technical Detail (Estimated)

Bridge / Detail	T55 MTU	Czech MT55	East German
Type of Launch	Cantilever	Scissors	Scissors
Time of Launch	3-5 min	1½-2 min	1½-2 min
Maximum Effective Span	17.5 m (57.5 ft)	16 m (53 ft)	18.5 m (60 ft)
Estimated Load Class	60	60	50

10.

SOVIET

TACTICAL MISSILES

FROG 7

FREE FLIGHT ROCKET

SYSTEM

SOVIET TACTICAL MISSILE - FROG 7

Summary

A comprehensive re-equipment programme of Soviet FROG Rocket Battalions is well advanced. The old tracked FROG 3/4/5 Rocket System has been replaced by FROG 7, first paraded in 1965. Several other Warsaw Pact Countries are also affected. At the same time there is evidence that the ponderous tactical handling of FROG Battalions is being superseded by a more flexible concept, approaching that used by NATO Forces.

FROG 7 was introduced by the Soviets to meet the requirements of improved range, accuracy, reaction time, re-fire time, destructive capability and overall mobility on the battle field. To achieve this, Soviet designers have evolved a system which includes the best features of their own FROG weapons as well as those of the HONEST JOHN.

The important characteristics of the FROG 7 system are:

a. Maximum range 65 kilometres

b. Increased Nuclear yields of up to 50 KT and possibly higher

c. An air brake attachment for engaging targets that would otherwise be screened by intermediate crests at short ranges

d. A mobile ZIL 135 re-supply vehicle carrying three reserve missiles, which accompanies each launcher

e. A self loading crane integral to the launcher

f. An improved wind gun for low level wind estimation

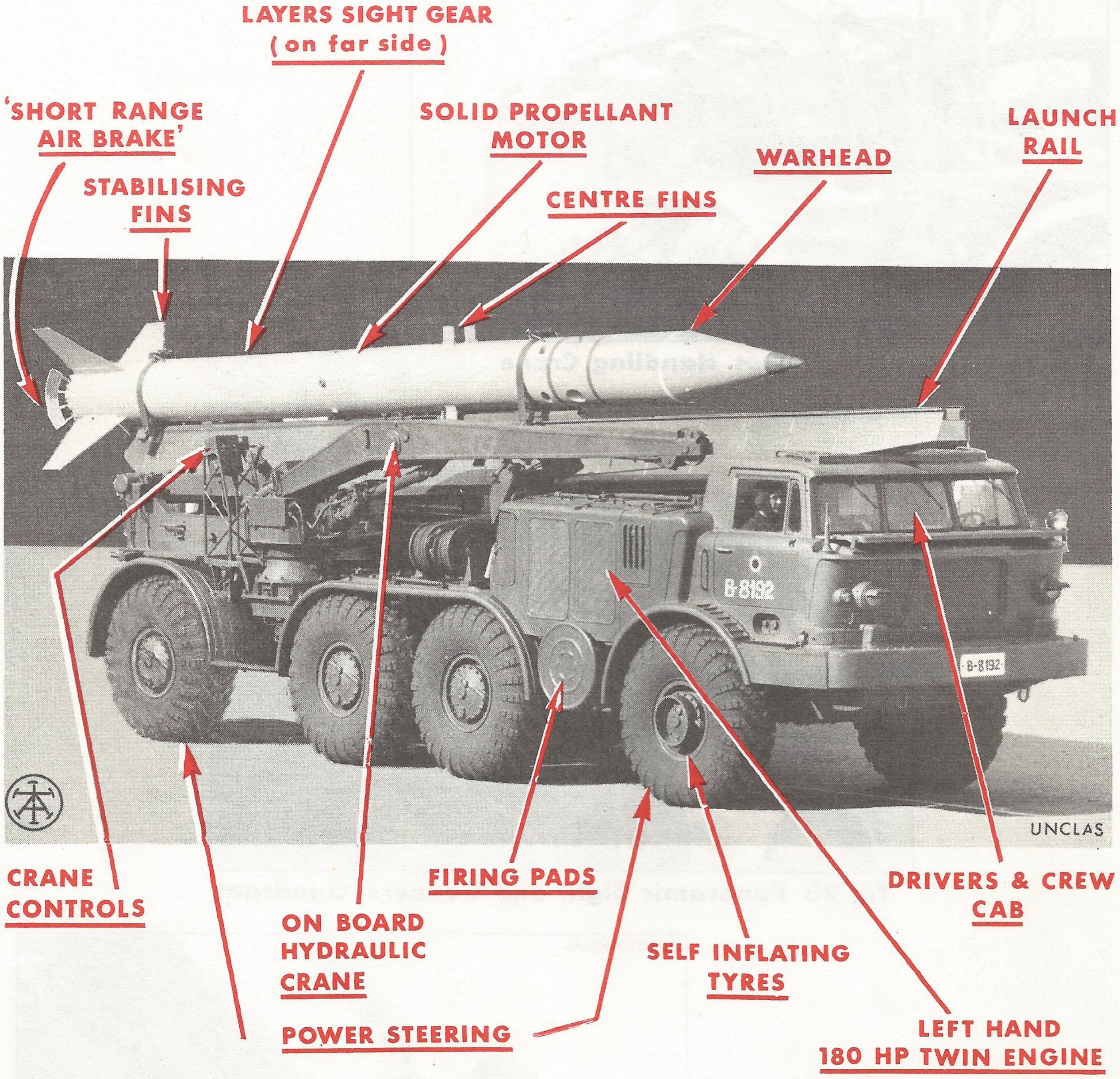
g. An automatic survey device

h. A reaction time capability of from ten to twenty minutes

j. Nuclear and Chemical capability

k. A highly mobile wheeled launcher based on ZIL 135.

Fig 1. FROG 7


LAYERS SIGHT GEAR (on far side)
'SHORT RANGE AIR BRAKE'
STABILISING FINS
SOLID PROPELLANT MOTOR
CENTRE FINS
WARHEAD
LAUNCH RAIL
B-8192
UNCLAS
CRANE CONTROLS
ON BOARD HYDRAULIC CRANE
FIRING PADS
SELF INFLATING TYRES
DRIVERS & CREW CAB
POWER STEERING
LEFT HAND 180 HP TWIN ENGINE

ZIL 135 WHEELED CHASSIS

DATA

Missile length___________30 feet (9·14 metres)
weight___________3 tons (3048 Kgs)
Range _______________ about 70Km
Probable Warhead types__Chemical, Nuclear, HE, & Training

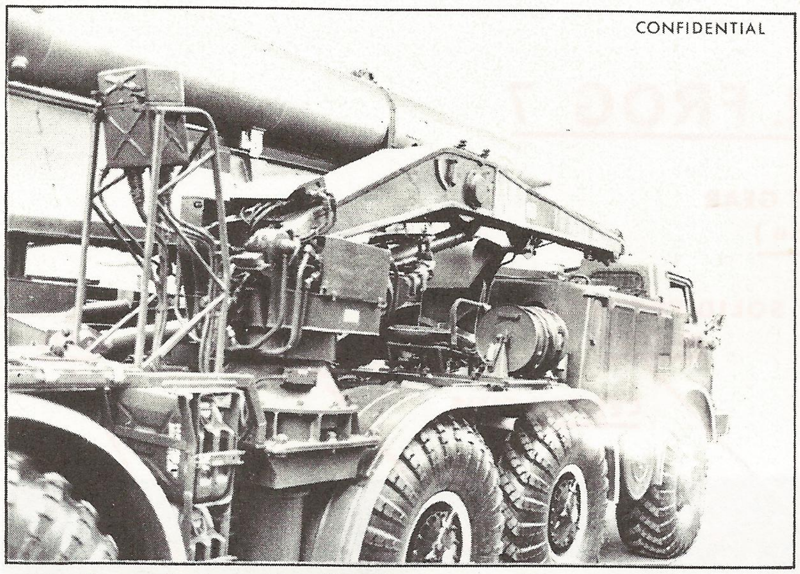

CONFIDENTIAL

Fig 2a Hydraulic Rocket Handling Crane

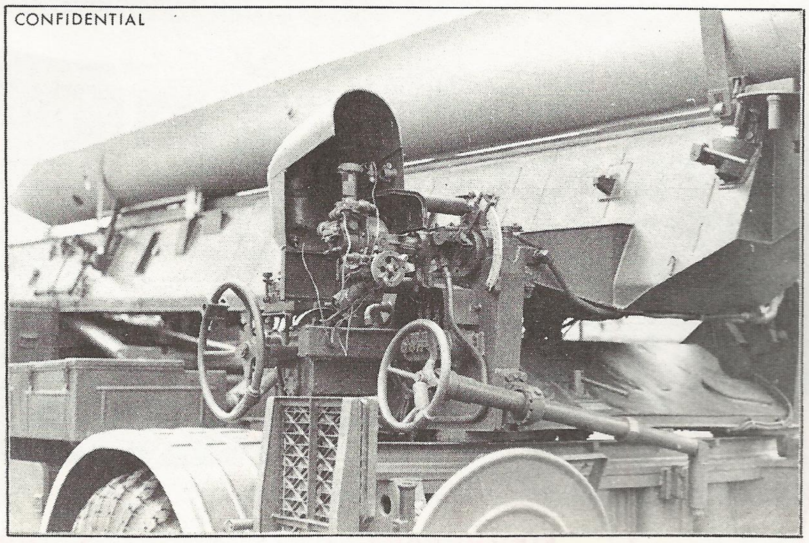

CONFIDENTIAL

Fig 2b Panoramic Sight and Gunners Quadrant

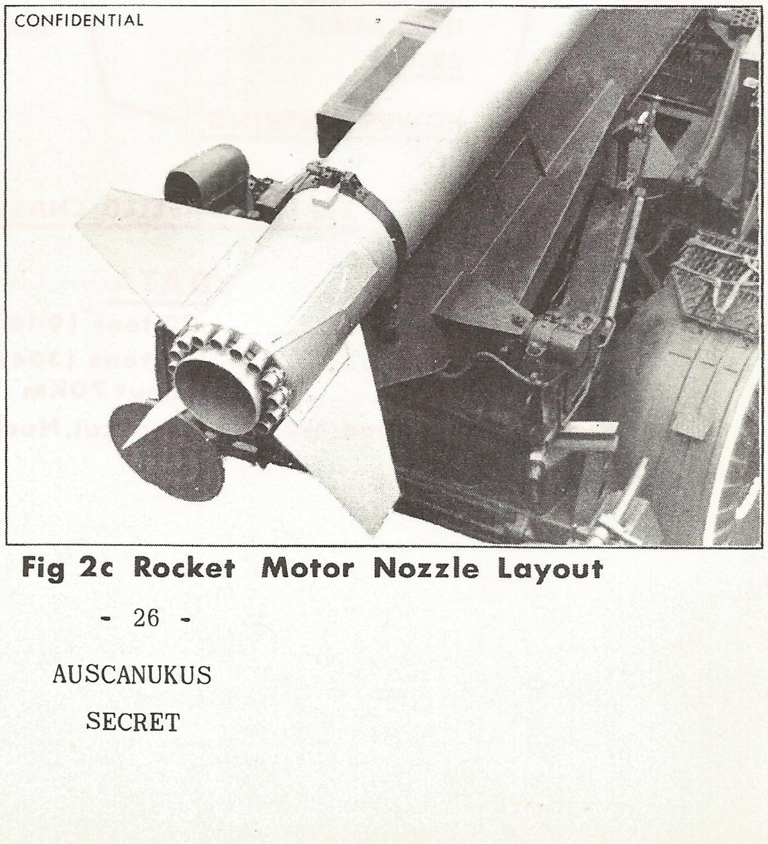

CONFIDENTIAL

Fig 2c Rocket Motor Nozzle Layout

The Soviet Requirement

Early in the development of their tactical missile system programme the Soviets realised that the mobility, range and accuracy of their early tracked missile systems were not of a sufficiently high order to engage nearly 50% of the targets necessary for the conduct of the fast moving battle that their doctrine demanded. An interim solution was to modify existing aerodynamic (cruise) missiles to produce accurate long range missiles, of which the now obsolete SALISH was an example (see ATIR No. 93).

To meet this requirement for improved performance,the tracked chassis of the FROG tactical missile launchers has been replaced by a wheeled chassis, and the range of the missile has been almost doubled - as has the maximum yield. The amount of ancillary equipment has been reduced and the complete weapon system made more mobile. For example, the old FROG re-supply trailer is replaced by a vehicle based on the launcher chassis. A crane is no longer required since this is replaced by the on board hydraulic crane of the FROG 7 launcher. Survey devices and low level wind devices have also been improved.

The FROG 7 Launcher

The FROG 7 launcher is based on the ZIL 135 eight wheeled chassis. A hydraulic rocket handling crane (Fig 2a), is mounted on the right hand side of the chassis. The launcher beam is elevated by a centre A frame which is operated by an electrohydraulic system. The beam owes much to the HONEST JOHN and incorporates a machined double rail at the forward end, on which the rocket shoes ride. The design is such that the missile has improved stability as it leaves the launcher.

A panoramic sight and gunners quadrant (Fig 2b) are now both on the left hand side of the launcher, instead of the previous arrangement with earlier FROGS of one either side. Traverse is by hand as is the levelling of the launcher beam on preparing for action.

The ZIL 135 chassis is powered by two 180 hp petrol engines, which give a maximum road speed of 45 miles per hour and a cruising range of 250 miles. There is some evidence that the complexity of the design necessary to achieve this has resulted, unusually for Soviet designed vehicles, in a high maintenance effort for the vehicle. The cross country performance is good and is achieved by eight wheel drive with the front and rear pairs of wheels steering.

The FROG 7 Missile

The missile is a 550 mm Free Flight Rocket that is fin stabilised in flight. Although the solid propellant tandem motor of previous models has been replaced, the motor still uses a main central exhaust nozzle surrounded by 16 small peripheral nozzles (Fig 2c). Six of these have fittings for an optional air brake attachment, necessary for the increased aerodynamic drag required to achieve the high trajectory for engaging close targets in any sort of hilly terrain. In fact it is fitted as standard procedure for targets below 30 kilometres. The FROG 7 nozzle layout gives improved thrust.

4 spin rocket motors, on the forward part of the missile, are fired to initiate spin once the rocket has cleared the launcher rails and four slightly canted tail fins maintain rocket spin in flight. Four small vertical stabilising fins are fitted approximately midway along the rocket body.

The warhead is conical and is an improved aerodynamic shape, compared with earlier models. So far only one warhead has been identified in training, although others doubtless exist. The missile is credited with both a nuclear and chemical warhead. The missile has a range of 65 kilometres with the nuclear warhead and probably a slightly greater range with the chemical warhead. Evidence exists that the fusing system incorporates mechanical, barometric and electronic devices.

Missile Air Brake

A problem inherent in long range Free Flight Rockets, such as FROG 7, is the low trajectory followed when engaging targets at short range. Since the velocity is not variable, the angle at which the missile is launched dictates the range that the missile achieves. The short range trajectory with a high velocity missile, therefore, is so low that the missile will hit even the smallest intervening crests or trees. In fact the problem is even greater than it would at first seem as the missile has to clear the intervening obstacles by a guaranteed safe height.

The effect of this on the FROG 7 missile trajectories can be seen on figure 4. In the type of terrain that FROG 7 can expect to be deployed, the ‘crest clearance’ problem could well force the minimum range up to approximately 30 kilometres. This would severely limit the value of FROG 7 as a practical weapon system.

The problem is solved in this case by fitting a drag device in the form of a cartwheel shaped air brake that is attached to the peripheral exhaust nozzles of the motor. (See Figure 3).

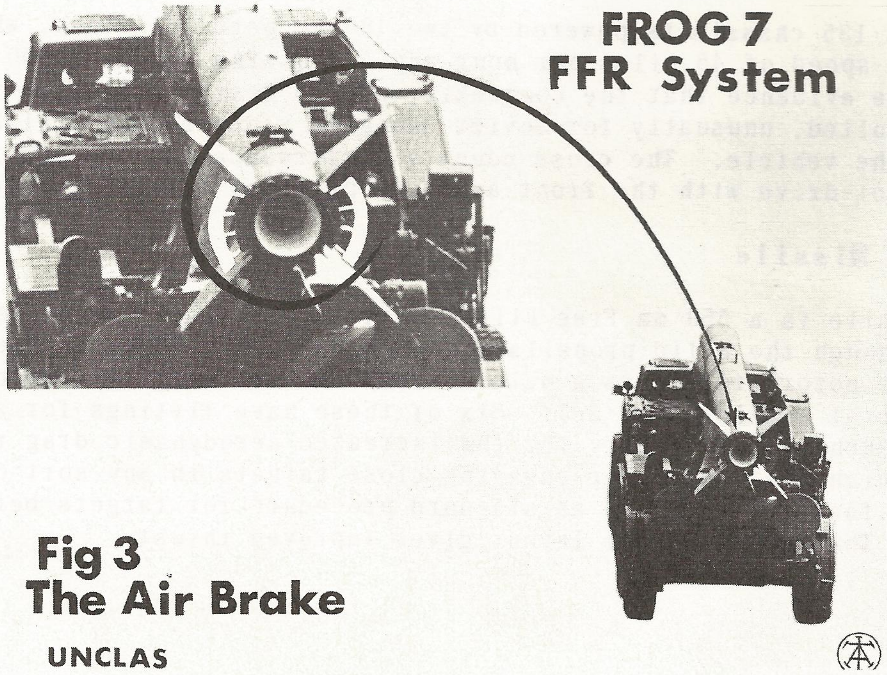


Fig 3
The Air Brake

UNCLAS

This increases the drag and hence the elevation that has to be laid on the launcher to reach the target. (See Figure 4).

This could be achieved by varying the motor thrust, but an air brake is a far simpler method and as such appeals to the Soviet designer.

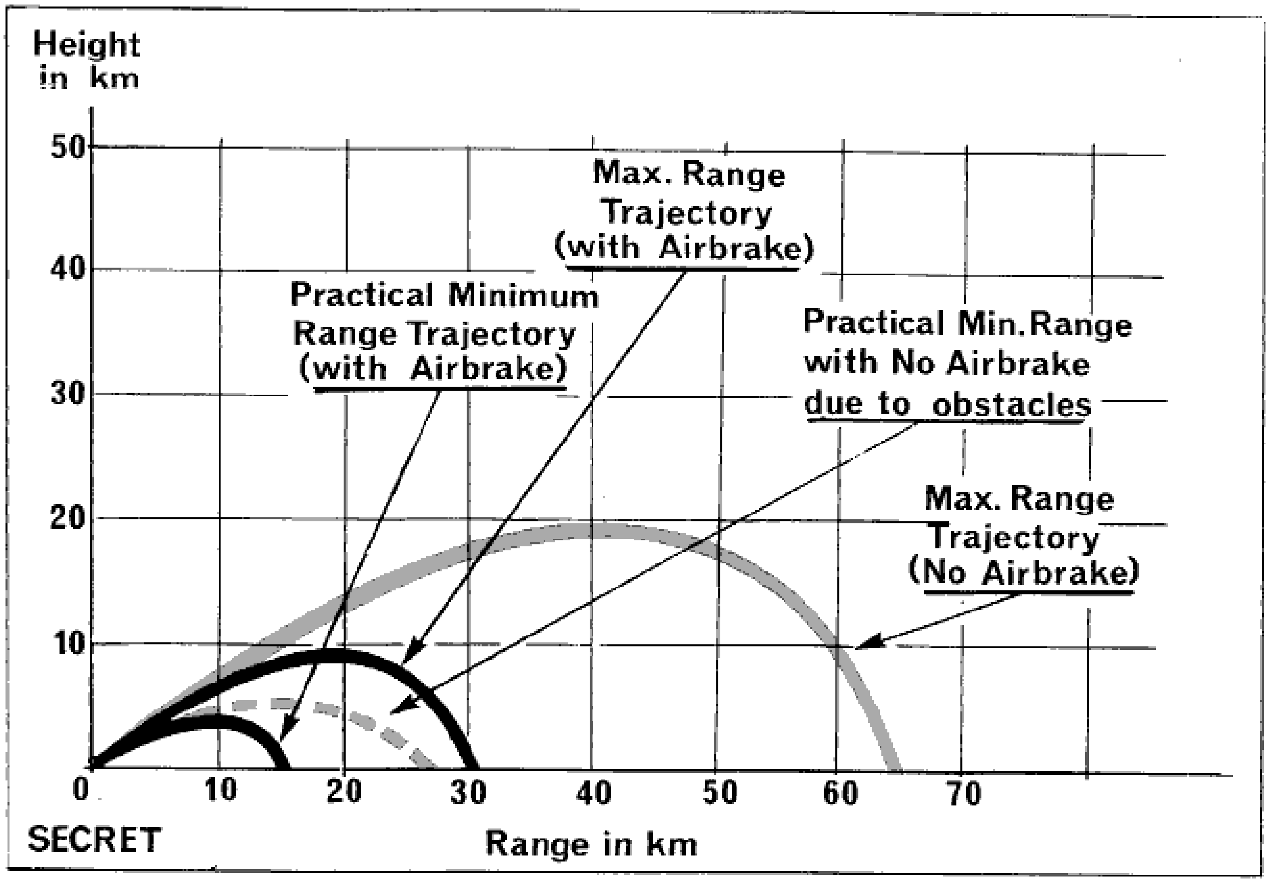


Fig 4. FROG 7 Long and Short Range Trajectories

The airbrake is fitted, as a standard drill, when engaging targets below 30 kilometres and it has the effect of reducing the practical minimum range to about 15 kilometres. In effect, the Soviet Divisional Commander has both a short range and a long range weapon available.

Nuclear Warhead Yields and Accuracy

There is evidence that the warheads include those with yields of up to 50 kilotons and possibly higher. This has yet to be confirmed. Similarly no firm evidence has been established to determine the detailed accuracy of the system. However engineering studies have given a CEP of 380 metres at two thirds range and 730 metres at maximum range.

HE and Chemical Warheads

Both HE and Chemical warheads have been reported, but these have not yet been identified. It follows Soviet philosophy to include both these in their armoury.

UNCLAS

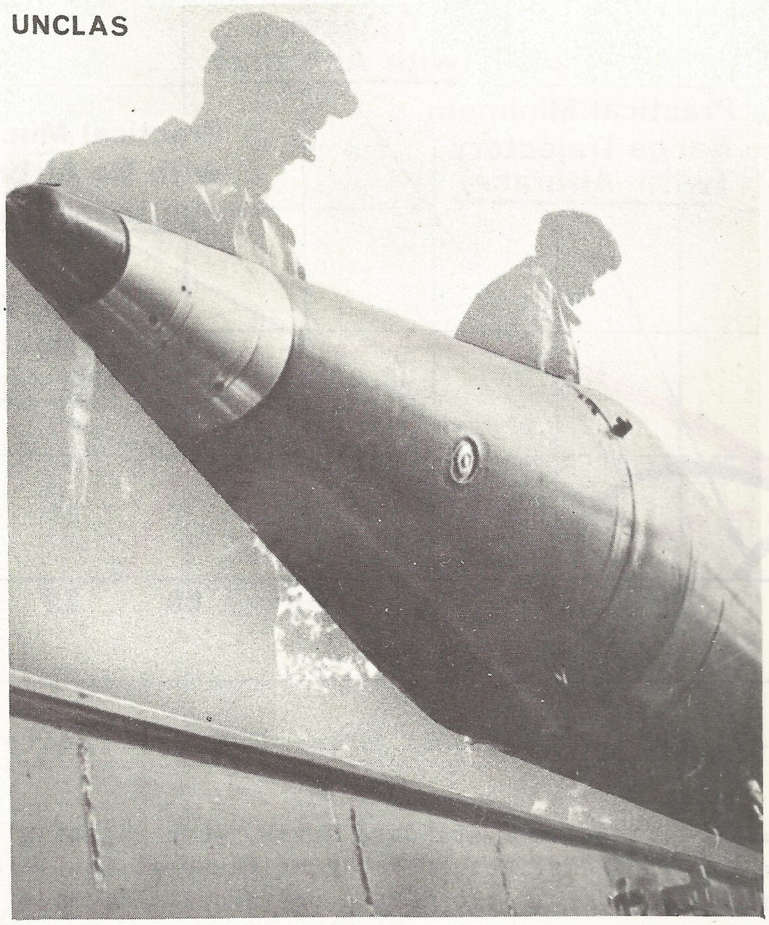


Fig 8. FROG 7 Warhead

The ZIL 135 Re-supply Vehicle

The introduction the the ZIL 135 Re-supply Vehicle represents a major advance in cutting down the amount of ancillary equipment and in improving the firing rate. It means that three replacement missiles are immediately available to the launcher. It also means that there is no longer a requirement for a guarded re-supply team, consisting of several vehicles, having to move out of cover to a pre-arranged RV to re-load the launcher, as was previously necessary. The ZIL 135 re-supply vehicle is now part of the Launcher Platoon, and it is simply a matter of driving alongside the FROG 7 launcher for immediate re-loading.

The re-supply vehicle is shown below. It is based on the FROG 7 launcher, and the chassis is identical. As such it matches the mobility of the launcher and both can be seen driving fast and well down East German roads at 70 KPH.

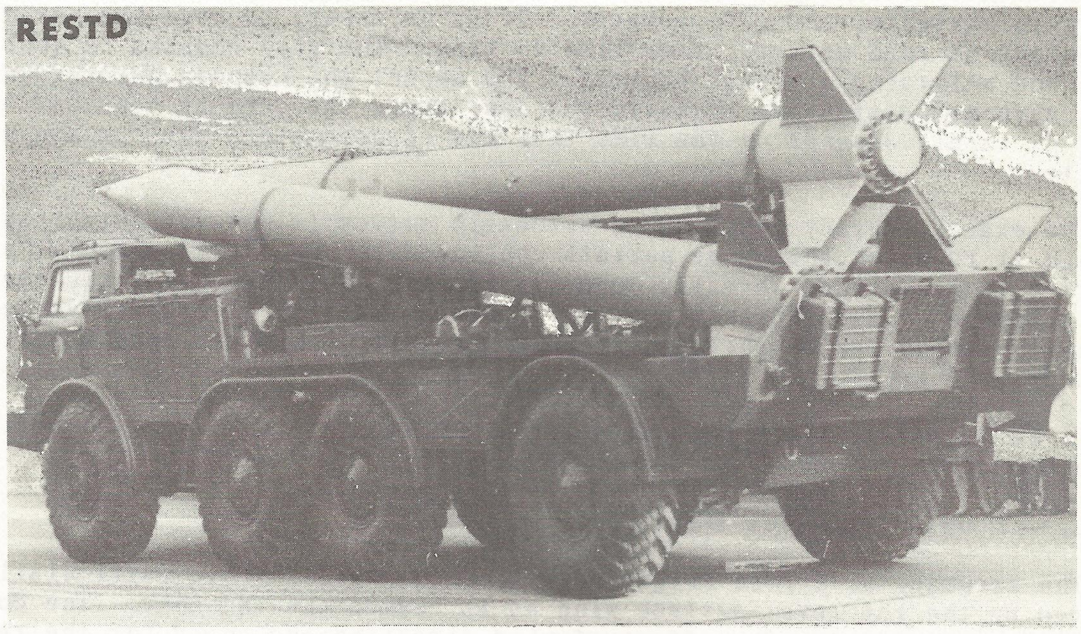
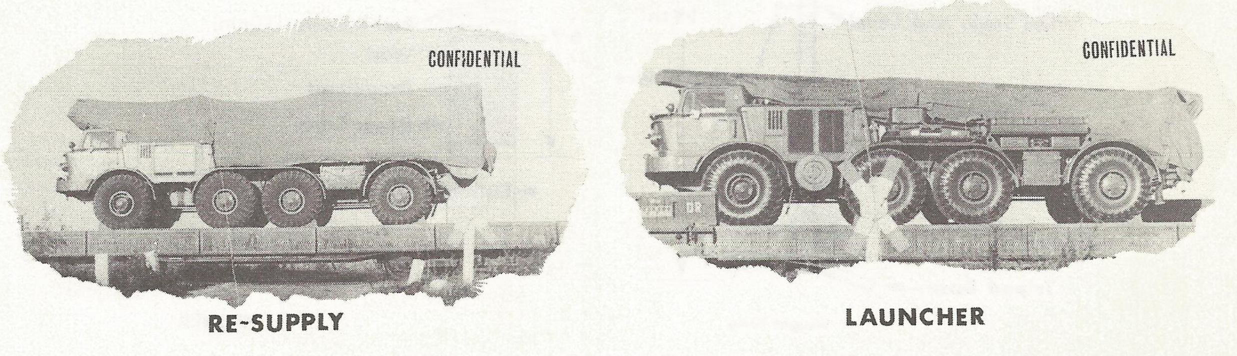


Fig 6. ZIL 135 Re-supply Vehicle

The launch rail is replaced by framing, to carry three checked out missiles. The hydraulic firing pads are no longer required and have been removed. The binning is different from the launcher and a protective bin is fitted to the rear of the chassis. The fins protrude into this bin.

The similarity between the two vehicles is such that when they have their tarpaulin covers in place it is not easy to distinguish between them (see Fig 7).



RE-SUPPLY

LAUNCHER

Fig 7. FROG 7 Re-supply Vehicle and Launcher (Tarped)

A crane is retained in the Technical Support Platoon, which is responsible for checking out and mating (if necessary) the newly arrived missiles, and loading them on to the re-supply vehicles.

The GAZ-69 Automatic Survey Vehicle (TOPO GAZ)

This vehicle is part of a firing battery or platoon, although it usually accompanies the Battalion Recce Officer as part of his Recce and Survey Party. The vehicle carries the traditional survey equipment. In addition it has a form of terrain navigator and gyro compass. It is necessary to zero the navigator at Trig points or road markers, from time to time. The gyro compass is constantly run up and maintains a preset bearing. The amount the compass pointer wanders due to gyro precession can be corrected for, since the rate is constant and the amount of wander depends on the time that has elapsed since the compass was last corrected.

The exact accuracy achieved by automatic survey is not yet established, although it is known that some purists continued to use the traditional methods of survey in preference to early TOPO GAZ models. This was primarily due to wheel slippage in mud and snow. It is reported that, by using this vehicle, a launcher position can be surveyed in approximately 10 minutes once a position is selected.

It is always possible that this terrain navigator might be made a fixture in the FROG 7 launcher.

Low Level Wind and Met Devices

The accuracy of a Free Flight Rocket, such as FROG 7, is particularly affected by the low level surface wind as it leaves the launcher. The Soviets also make allowance for the effect of wind direction and speed for the remainder of the powered flight, i.e. while the motor is still burning. Conventional meteorological data is usually transmitted by Division at two hourly intervals. The END TRAY RADAR and SONDE, believed to be held by Battalion, can produce this as well. The original method of establishing low level wind was by using the BREAD BIN radar, which tracked a reflecting SONDE. This has been replaced by the wind gun (see Figure 8).

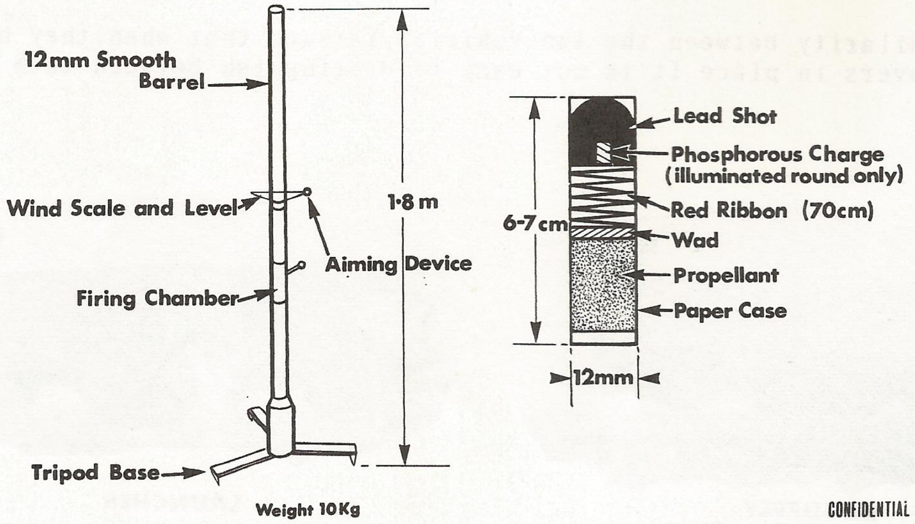


Fig 8. FROG Wind Gun and Shot

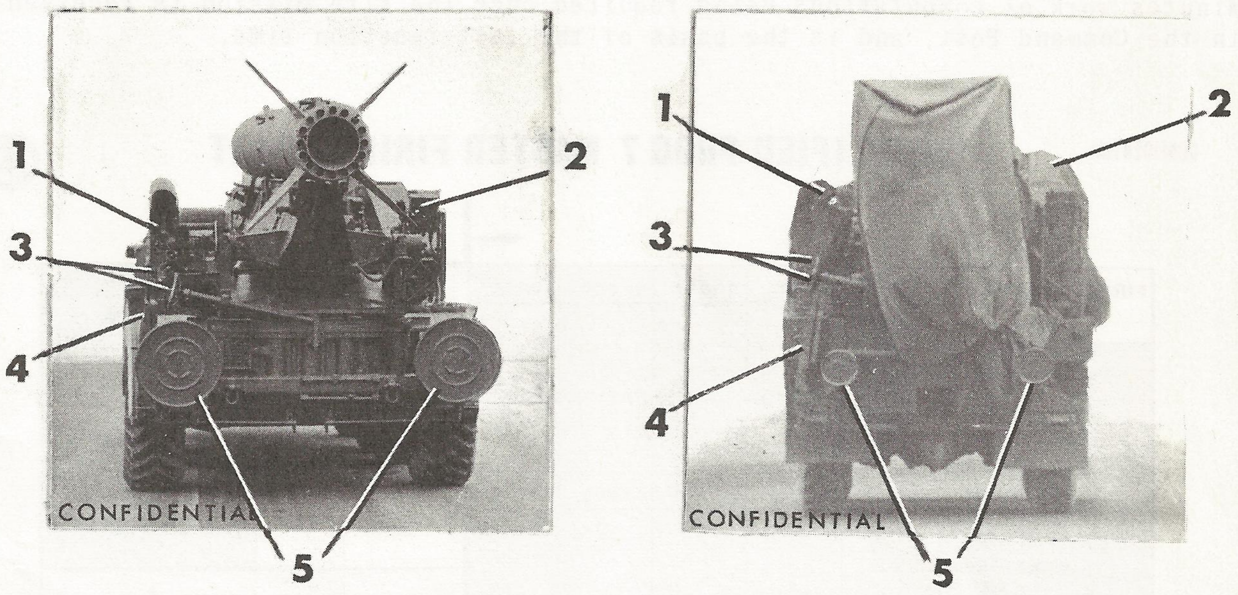
The wind gun is a tube that fires an accurately weighted ball, to which a coloured tape is attached, 500 metres vertically into the wind shortly before launching the FROG 7 rocket. The direction and amount of deflection that results is compared with tables to establish the necessary correction for low level wind effects.

The extent to which the Soviets rely on Divisional met reports for the wind variations during the remainder of the powered flight depends on circumstances and the practice of different divisions. There is evidence that some units prefer to use the Battalion END TRAY radar for this. This radar has the capability of visual tracking of the SONDE balloon which could replace, if needs be, the wind gun. Conventional Met, similar to the NATO Met Message, is used in the normal manner.

Training Devices

In addition to using the usual training devices, such as cut away motor trainers and warhead trainers, the Soviets demand a complete training launcher and missile device. On FROG 3 this was the wheeled FROG 6 Trainer. The admirable philosophy behind this is to ensure that complete training in barracks can be carried out without causing wear on combat equipment.

The FROG 7 trainer is shown in Fig 9. All the necessary devices for training are fitted on this equipment, including those necessary to practice re-loading and prefire checks. Some of these can be seen below. Drivers are trained on separate vehicles.



LAUNCHER **TRAINER**

1. **Sights**
2. **Crane and Control**
3. **Laying Gear**
4. **Layers Platform**
5. **Jacks**

Fig 9. FROG 7 Trainer

Command Post Computations

It is Soviet policy to train carefully selected personnel from their already hand picked missile troops for key jobs. These personnel receive long and intensive training in their own specific duties but not in any other, unless they are the specific nominated relief in the event of casualties. This system produces a very high standard of operator, although there are obvious disadvantages.

This training allows the Soviets to demand more of their computers (Junior and Senior Fire Directors) when computing a Fire Mission on the Master Firing Chart. The method of computation used requires Centre of Arc (Rough Azimuth of Fire), Met Data, Missile Data and Launcher Co-ordinates to be passed to the Fire Directors, if possible, before the Fire Mission. This allows the Master Firing Chart to be completed for range brackets (extending from minimum range out to maximum range) in order to produce the corrections that will be applied to the map range and azimuth to the target, when it is known. A simplified diagram of a Master Firing Chart is shown at Figure 10.

The use of this method of computation can result in only a further ten minutes work of computations being required once the Fire Mission is received in the Command Post, and is the basis of the fast reaction time.

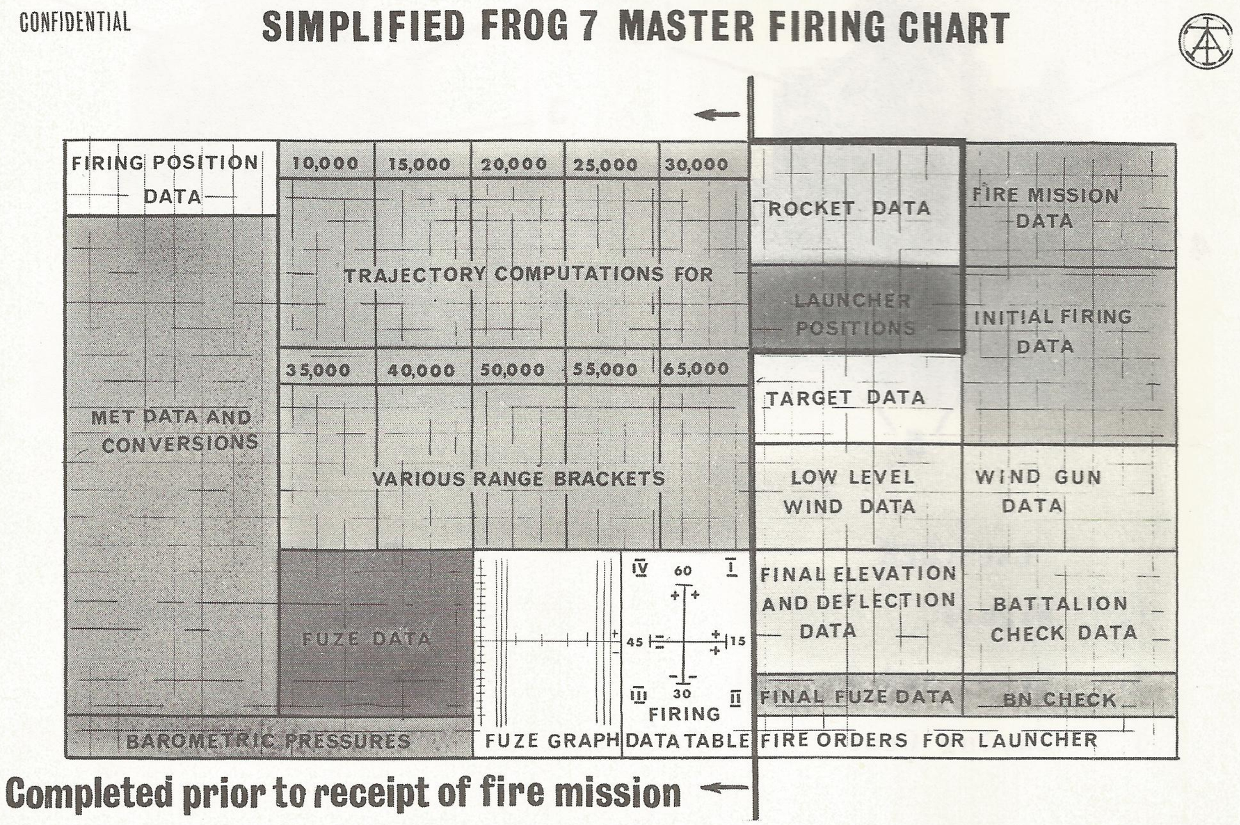

CONFIDENTIAL
SIMPLIFIED FROG 7 MASTER FIRING CHART
FIRING POSITION DATA
10,000
15,000
20,000
25,000
30,000
TRAJECTORY COMPUTATIONS FOR
35,000
40,000
50,000
55,000
65,000
VARIOUS RANGE BRACKETS
MET DATA AND CONVERSIONS
FUZE DATA
IV
60
I
45
15
III
30
II
BAROMETRIC PRESSURES
FUZE GRAPH
FIRING DATA TABLE
ROCKET DATA
FIRE MISSION DATA
LAUNCHER POSITIONS
INITIAL FIRING DATA
TARGET DATA
LOW LEVEL WIND DATA
WIND GUN DATA
FINAL ELEVATION AND DEFLECTION DATA
BATTALION CHECK DATA
FINAL FUZE DATA
BN CHECK
FIRE ORDERS FOR LAUNCHER
Completed prior to receipt of fire mission

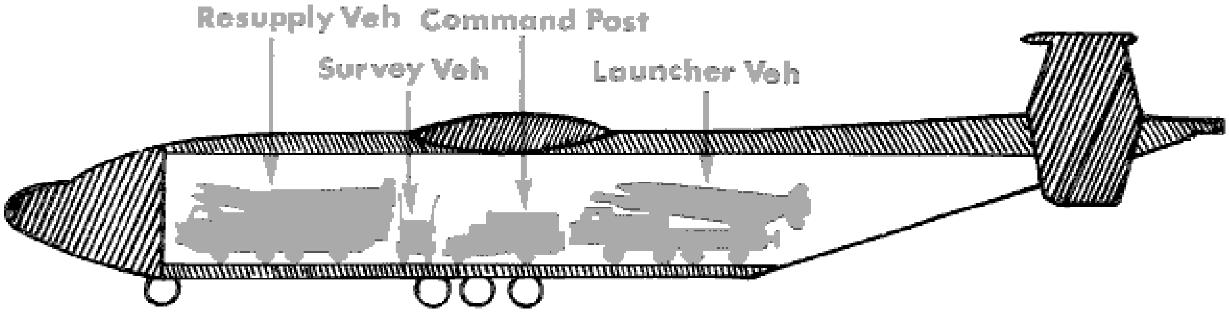
Fig 10. Simplified FROG Master Firing Chart

Air Portability

Both the warhead and the complete missile can be lifted by Soviet helicopters. Figure 11 shows how a complete Launcher Platoon will fit in the largest Soviet transport aircraft the AN 22 (NATO nickname COCK). Probably a further 6 AN 22 would be required to airlift the complete FROG Battalion, with its complement of 4 launchers, a non stop 5000 miles should the need arise. However since this is a major part of the AN 22 Fleet, it is not suggested that this is true air portability in any strategic sense.

Fig 11

A Possible Layout for Firing Platoon in AN22(COCK)



Weight of Platoon :- Approx 65 short tons

Aircraft Range ......:- Approx 3500 miles at 350kts

SECRET

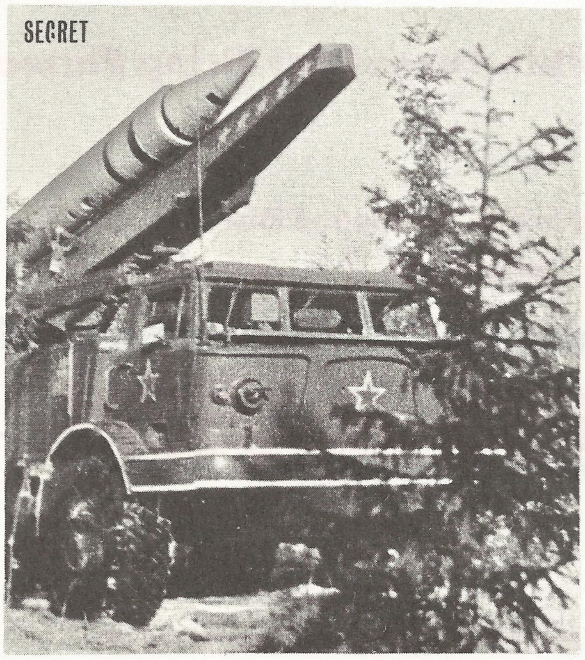
Deployment Philosophy

The Soviets are still exploring the possibilities of the FROG 7 system and do not appear to have yet decided on the best organisation or method of tactical handling. Probably a four launcher Battalion, of two Batteries each of two Launcher Platoons will emerge. Whether they will still use two launchers to cover one target, as was previous practice on the older tracked FROGS, is not certain. However, they are known to keep a proportion of launchers at readiness solely for the purpose of quickly engaging NATO tactical nuclear delivery means, as soon as they are detected.

·STOP·PRESS·

11. NEW FROG 7 WARHEAD (SECRET)

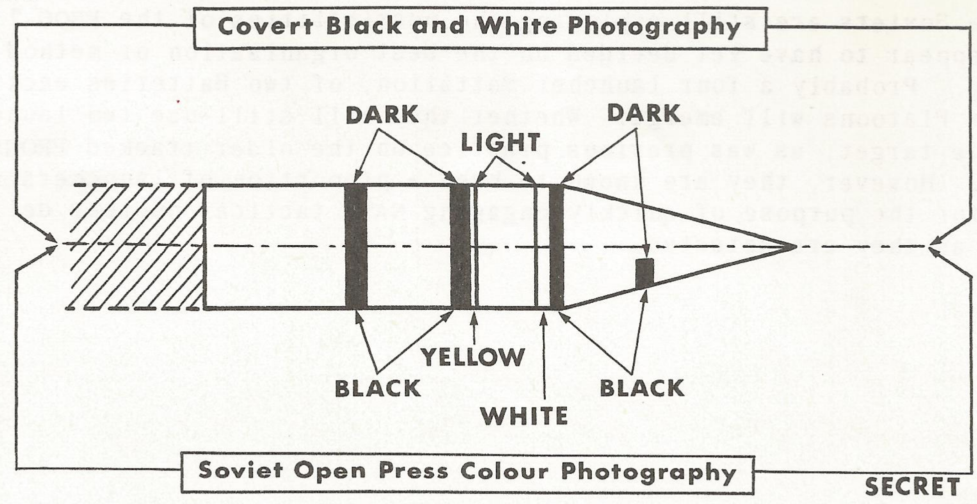
The Soviets are now known to be training with a new warhead that is approximately 1.75 feet longer than the warhead previously seen with the FROG 7 FFR System.



New FROG 7 Warhead

Recognition

On each occasion that this new warhead has been sighted it has shown characteristic marking bands. It is not yet possible to confirm the colours used. (See diagram below).


1"
Covert Black and White Photography
DARK
LIGHT
DARK
YELLOW
BLACK
WHITE
BLACK
Soviet Open Press Colour Photography
SECRET

Warhead Markings

The increased length of the longer warhead causes the complete missile to extend to the centre of the launcher cab. With the shorter warhead fitted the missile extends only as far as the rear of the cab. This is a good recognition feature.

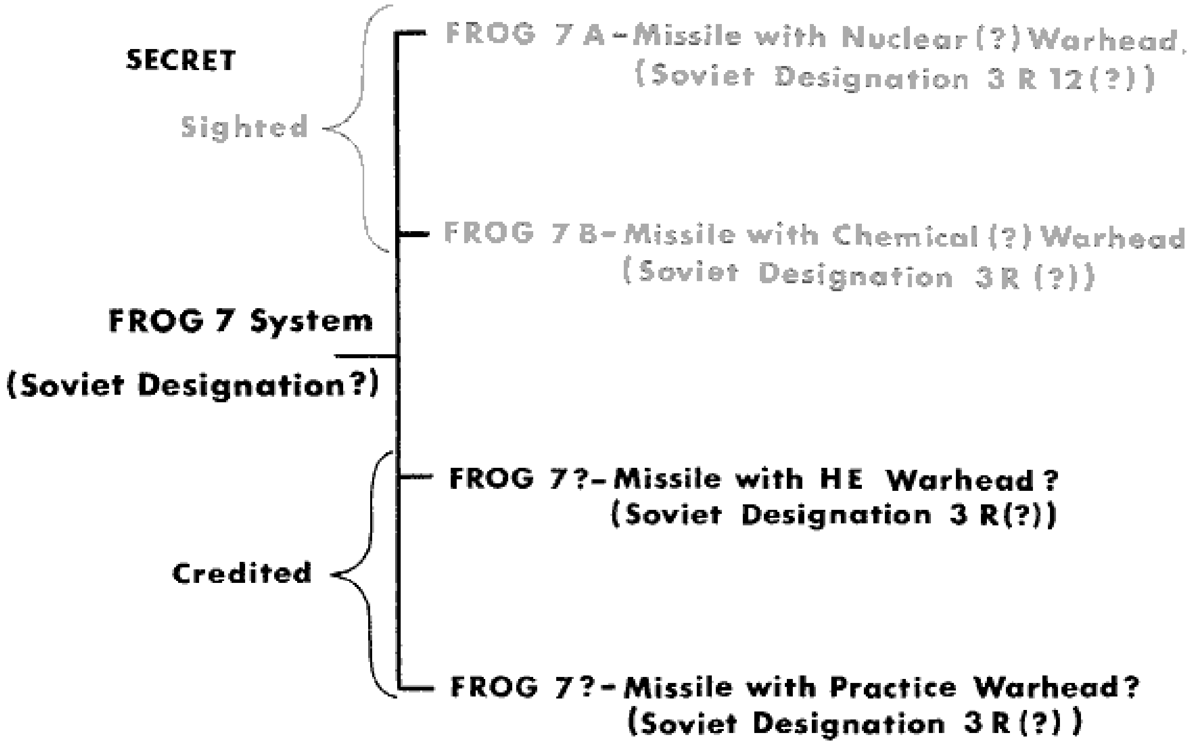
Assessment

The sighting of this new warhead does not alter the existing assessment of the warhead types credited to the FROG 7 system. Although there is insufficient information to state which role (HE, Nuclear, Chemical or Training) the new warhead has in the FROG 7 warhead family, it could well be the chemical round.

Designations

In order to follow the Soviet method of missile designations for warhead variants in a missile system the following designations will now be adopted.

A FROG 7 missile carrying the original or shorter warhead will be designated FROG 7A and a missile carrying the recently sighted or longer warhead will be designated FROG 7B. The form of the expected FROG 7 family is shown below. Allowance has been made on the diagram for new warhead sightings.


SECRET
FROG 7 A - Missile with Nuclear (?) Warhead, (Soviet Designation 3 R 12(?))
Sighted
FROG 7 B - Missile with Chemical (?) Warhead (Soviet Designation 3R (?))
FROG 7 System
(Soviet Designation?)
FROG 7? - Missile with HE Warhead? (Soviet Designation 3 R(?))
Credited
FROG 7? - Missile with Practice Warhead? (Soviet Designation 3 R (?))

Sighting Diagram

Reporting

In future, if identification is possible, collectors should report whether the FROG 7 they have sighted is a FROG 7A or a FROG 7B.

CHARACTERISTICS

Data Sheet No.	B6
Date	March 1969
Designation	FROG 7 FREE FLIGHT ROCKET SYSTEM
Function	Tactical support of ground forces

Missile Characteristics

a. Configuration:

Length	(FROG 7A)	9.1 m	30 ft
	(FROG 7B)	9.6 m	31.75 ft approx
Diameter		550 mm	1.8 ft
Launch weight (Approx)		2,750 kg	6,000 lb

b. Propulsion: Solid propellant motor employing central and peripheral exhaust nozzles.

c. Warhead: HE, CW or Nuclear, estimated weight 850 lb. Yields up to 50 kt and possibly higher.

d. Fuzing: Estimated mechanical, and barometric electronic devices giving air and ground burst capability.

e. Radars: Probably END TRAY for meteorological data.

Supporting Vehicles and Equipment

a. Launcher: The launcher is mounted on the ZIL 135 type 8 wheeled chassis. This has an onboard crane for missile self loading.

b. Re-supply Vehicle: The ZIL 135 chassis is also used for the re-supply vehicle, which can carry 3 missiles.

c. Wind Gun: A simple vertically firing wind gun is used to determine low level wind.

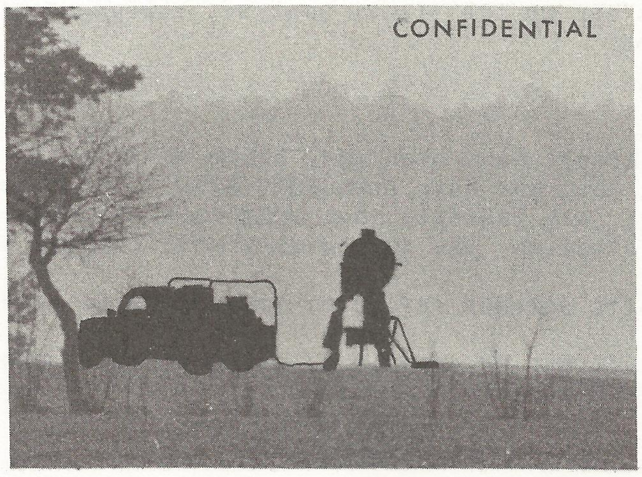
d. FROG 7 Trainer: A trainer, similar to FROG 6, has been identified.

e. Survey Vehicle: The TOPO GAZ automatic survey vehicle is believed to be available for survey.

Characteristics (continued)

System Mobility	The wheeled chassis gives improved overall mobility for the launcher. There is no longer a requirement for a low loading trailer for the launcher, a separate crane nor a re-supply semi trailer. This improves the overall mobility of the complete system.
System Operation	The launcher rail is laid in the same fashion as a gun and the missile follows a ballistic trajectory.
System Performance	a. Maximum Range 65,000 m 71,000 yd b. Minimum Range (approx) 15,000 m 16.500 yd (A cartwheel shaped air brake for increased drag is fitted to the rear of the missile when engaging targets below 30 kilimetres). c. Accuracy (est.) Two thirds range CEP 380 metres. Maximum range CEP 730 metres.
Status	First seen in November 1965. Most Soviet front line FROG Battalions are equipped with this system, as are several other Warsaw Pact countries.

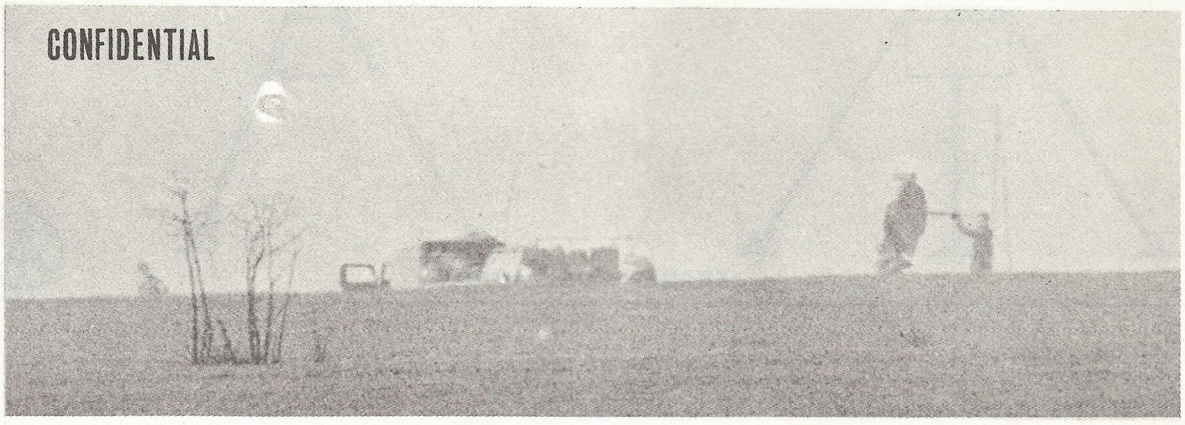
12. POLE DISH-Radar Intercept and Direction Finder (SECRET AUSCANUKUS)



POLE DISH

General

POLE DISH was seen in East Germany from 1964 until 1967. It is Artillery associated and appears to be part of an ECM Unit. POLE DISH is now held to be a radar intercept and direction finding equipment either complementing or supplementing the equipments of the RPS-1 system, BRICK ROUND and BRICK SQUARE.



POLE DISH

Description

POLE DISH consists of a pole mounted parabolic antenna erected from a tripod. A box, probably housing electronic equipment and an azimuth measuring device, is incorporated into the head of the tripod. A GAZ-69 vehicle is associated with the equipment, and appears to be connected to it by cable. The GAZ-69 contains a U/I radio with a Whip Antenna and other U/I equipment.

POLE DISH - Radar Intercept and Direction Finder (continued)

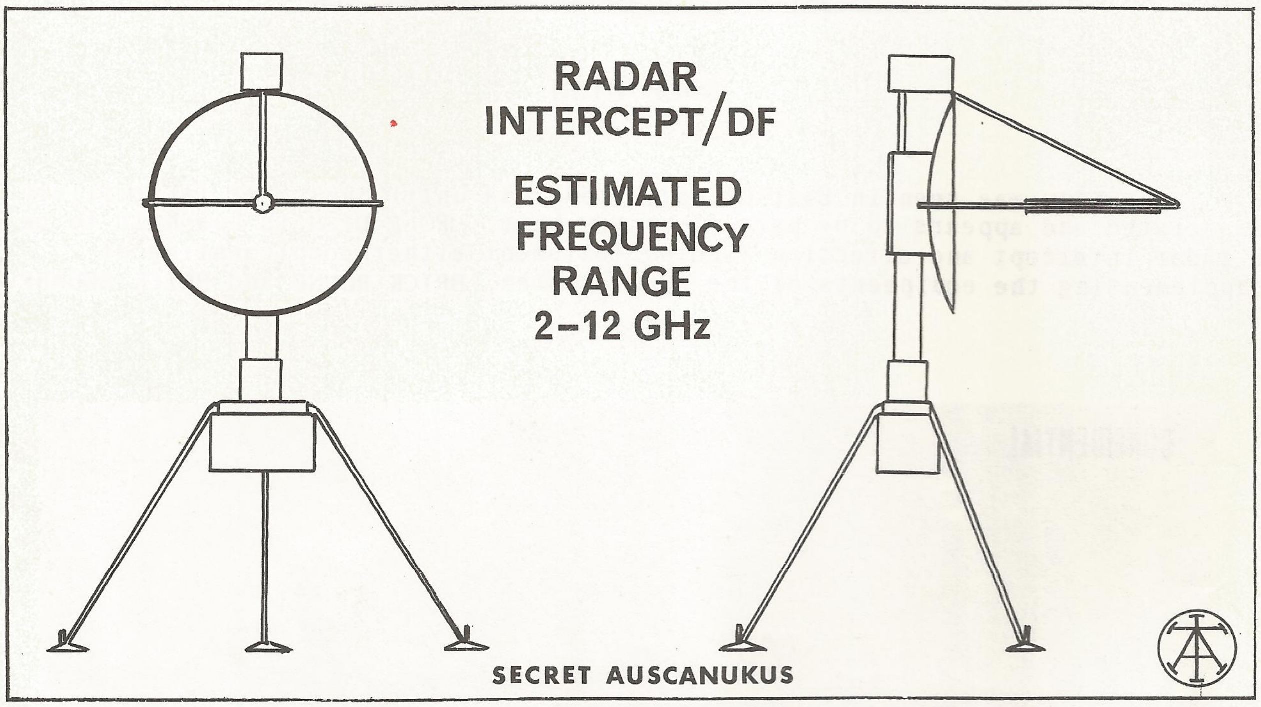
Another box is sometimes seen on the ground with POLE DISH. Its approximate dimensions are 50 cms high by 60 cms long and appears to be connected to POLE DISH by cable. This may be the signal analyser equipment similar to that used with the RPS-1 system.

Developments

No positive sightings have been made since 1967, although there have been reports of equipment that may have been POLE DISH. The reports, together with the lack of sightings, may indicate that POLE DISH is being modified. From the scanty available information, the following visual changes are possible:

a. The parabolic antenna reflector may now be of mesh construction

b. The equipment may be capable of being operated from a mounted position in the GAZ-69 vehicle.



POLE DISH Radar

Collection Requirement

a. Photography of POLE DISH and associated vehicles and equipment

b. Description of all activity associated with POLE DISH e.g. Into/out of action drills, method of search by antenna, position of operators when in action.